DOCUMENT RESUME

ED 315 266 SE 050 274

AUTHOR Pfundt, Helga; Duit, Reinders
TITLE Bibliography. Students' Alternative Frameworks and Science Education. 2nd Edition.
INSTITUTION Kiel Univ. (West Germany). Institut fuer die Paedagogik der Naturwissenschaften.
PUB DATE 88
NOTE 227p.; Reduced-size, filled-in type throughout.
PUB TYPE Reference Materials - Bibliographies (131)
LANGUAGE English; German

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Biology; Chemistry; *Cognitive Structures; *Concept Formation; Elementary School Science; *Misconceptions; *Physics; Reference Materials; Science Instruction; *Secondary School Science
IDENTIFIERS *Science Education Research

ABSTRACT

Considerable attention has been focused on research on students' conceptions of science. This bibliography is intended to be a comprehensive picture of what has been done concerning this topic. It contains about 1,500 references. The bibliography is divided into two parts. The first part includes articles before 1987. The references are organized into several sections: (1) general considerations; (2) everyday notions and scientific notions; (3) the development of notions; (4) language; (5) methods of investigation; (6) investigations of specific notions in physics, chemistry and biology; (7) research which took these notions into account; (8) investigations of teachers' notions; and (9) notions and teacher training. Of the subject areas, physics is best represented. This document is presented in German and English. (CW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Helga Pfundt / Reinders Duit

Bibliography
Students' Alternative Frameworks and Science Education

Bibliographie
Alltagsvorstellungen und naturwissenschaftlicher Unterricht

2nd Edition / 2. Auflage

Institute for Science Education
Institut für die Pädagogik der Naturwissenschaften

Helga Pfundt / Reinders Duit

Bibliography
Students' Alternative Frameworks and Science Education

Bibliographie
Alltagsvorstellungen und naturwissenschaftlicher Unterricht

2nd Edition / 2. Auflage

34

IPN Reports-in-Brief
IPN-Kurzberichte

IPN

INSTITUTE FOR SCIENCE EDUCATION
INSTITUT FÜR DIE PÄDAGOGIK DER NATURWISSENSCHAFTEN
AN DER UNIVERSITÄT KIEL

Karl Frey, Geschäftsführender Direktor
Horst Bayrhuber, Direktor am Institut
Thorsten Kapune, Leiter der Zentralabteilung
Heinrich Stork, Direktor am Institut
Walter Westphal, Direktor am Institut

Reinders Duit, Vorsitzender des Wissenschaftsausschusses

1988 · IPN · Institut für die Pädagogik der Naturwissenschaften
an der Universität Kiel (Institute for Science Education)
Olshausenstraße 62
D-2300 Kiel 1
Federal Republic of Germany

Permission for reprinting (including excerpts) can be obtained from the Institute.

Nachdruckgenehmigung – auch für Auszüge – kann beim Institut eingeholt werden.

VORWORT

Der "Boom" an Forschungsarbeiten im Bereich "Schülervorstellungen und naturwissenschaftlicher Unterricht" ist ungebrochen. Die erste Auflage der Bibliographie (1985) enthielt etwa 700 Literaturzitate, bei der vorliegenden zweiten Auflage (1988) sind es bereits etwa doppelt so viele.

Die Bibliographie basiert auf einer Literatursammlung, die Helga Pfundt vor etwa 12 Jahren begonnen hatte. Sie wird seit ihrem frühen Tod im Oktober 1984 von mir fortgeführt.
Ich bin Physikdidaktiker. Deshalb dürfte der Bereich der Physik in der Bibliographie am vollständigsten repräsentiert sein. Bis zum Jahre 1984 betreute Helga Pfundt den Bereich der Chemie. Seitdem informiert mich mein Kollege Werner Dierks über chemiedidaktische Arbeiten, die ich übersehen habe. Den Bereich der Biologie haben wir seit Beginn der Arbeiten an unserer Literatursammlung eher vernachlässigt. In der neuen Auflage aber dürfte auch dieser Bereich angemessen repräsentiert sein. Miles Barker hat mir die Literaturliste seiner Dissertation (s. g6, B; S. 86) geschickt, die viele Untersuchungen zu Vorstellungen im Bereich der Biologie enthält. Andre Giordan hat eine umfangreiche Bibliographie (s. g1; S. 8) zur empirischen Unterrichtsforschung im Bereich der Biologie vorgelegt, die auch Untersuchungen zu Vorstellungen berücksichtigt. Schließlich ist jüngst die sehr umfassende Dokumentation von Wandersee und Mintzes (s. app. g6, B; S. 142) erschienen. Arbeiten zu Vorstellungen, die in diesen drei Publikationen aufgeführt werden, habe ich in die vorliegende Bibliographie übertragen.

Die Bibliographie besteht aus zwei Teilen. Der erste Teil (etwa 1200 Titel) umfaßt die Arbeiten, die wir bis Dezember 1987 aufgenommen haben. Seit diesem Zeitpunkt nehmen wir die neuen Titel auf einem PC auf. In kurzer Zeit war diese neue Sammlung auf über 300 Titel angewachsen. Wir haben uns deshalb entschlossen, diesen Teil als Appendix an die bereits vorbereitete Ausgabe des oben genannten ersten Teils anzufügen. Zusammenführen ließen sich die beiden Dateien leider noch nicht. Sie sind auf unterschiedlichen Computersystemen gespeichert.

Eine Bibliographie wie die vorliegende ist die gemeinschaftliche Arbeit vieler. Hans-Jürgen Waldow hat das Computerprogramm für die Aufnahme und Speicherung der Literaturzitate entwickelt. Er hat weiterhin den Ausdruck des ersten Teiles der Bibliographie betreut. Hans Dörr hat die Bibliographie bis 1986 verwaltet. Renate Meyer übt diese Tätigkeit seitdem aus. Ihnen allen danke ich ganz herzlich. In diesen Dank schließe ich die vielen Kollegen ein, die mir ihre Artikel geschickt und dadurch dafür gesorgt haben, daß die Bibliographie so umfangreich geworden ist.

Reinders Duit, März 1988

Adresse: Reinders Duit
IPN-Institut für die
Pädagogik der Naturwissenschaften
an der Universität Kiel
Olshausenstr. 62
D-2300 Kiel 1

FOREWORD

There is still a boom of research on students' alternative frameworks (students' conceptions) in science. The first edition of this bibliography contained some 700 quotations, the second edition (1986) arrived at some 1,500. The bibliography is based on a collection of papers Helga Pfundt started almost 12 years ago. Sadly, Helga Pfundt died in October 1984. Since then I have taken care of the bibliography.

I am a physics educator, which probably means that the area of physics will be best represented. Until 1984 Helga Pfundt, a chemistry educator, took care of the chemistry education side. Since then my colleague Werner Dierks has helped me to keep track of what is going on in this field of chemistry education research. Biology had been given only little attention for many years, but in the new edition also appears to be represented quite adequately. Miles Barker provided me with a long list of articles on students' conceptions research in biology when sending parts of his PhD thesis (s. g8, B; S. 86). André Giordan has published a bibliography of research on biology instruction. This bibliography contains many articles which fall into students' conceptions research and could be regarded here. Finally, a recent review article by Wandersee and Mintzes (s. app. g6, B; S. 142) provided me with a very comprehensive overview of articles in the area of biology instruction.

The present bibliography is divided into two parts. The first one (some 1 200 quotations) contains the articles entered before December 1987. Since then we have used a PC for storing information on new articles. In a very short period of time the number of quotations stored on the PC rose to around 300. We thought it would be useful to enlarge the new edition of the bibliography by adding this quite important number of articles. Unfortunately, the two computer systems used are not compatible. It will be some months before we can bring both data stores together.

Many people were involved in the work on the bibliography. Hans Jürgen Waldow developed the computer program for storage of the first part and also helped in printing out this part. Hans Dörr ran the bibliography until 1986. Since then Renate Meyer has run it. Many thanks for their excellent work! Further thanks go to all the many colleagues who submitted their papers. They helped the bibliography to mirror research in the field of students' notions in science in what we feel is a comprehensive manner.

Reinders Duit, March 1988

Mailing address:

Reinders Duit
IPN Institute for Science Education
at the University of Kiel
Olshausenstr. 62
D-2300 Kiel 1
F. R. Germany

INHALTSVERZEICHNIS	TABLE OF CONTENTS	SEITE/ PAGE
Einführung		xi
(1) Zum Umgang mit der Bibliographie		xi
(2) Trends im Forschungsgebiet		xix
	Introduction	xxvii
	(1) How to use the bibliography	xxvii
	(2) Remarks on trends in the research area	xxxiv
Bibliographie Teil I	Bibliography part I	1
Bibliographie Teil II	Bibliography part II	111
(s. Details unten)	(see details below)	
Autorenregister	Authors' index	159
Adressenliste	List of addresses	169
Liste der Schlagwörter	List of keywords	187

Liste der Publikationen in Teil I und Teil II	Lists of publications in part I and part II	Part I App.	Part II app.
g1 Zum Umfeld des Problems "Vorstellungen der Schüler"	g1 General considerations concerning research in this area	3	113
g2 Alltagsvorstellungen und wissenschaftliche Vorstellungen	g2 Everyday notions and scientific notions	24	118
g3 Geschichtliche und individuelle Entwicklung von Vorstellungen	g3 Development of notions in the history of science as compared to development of notions in individuals	25	119
g4 Sprache und Vorstellungen	g4 Language and notions	27	120
g5 Methoden zur Erfassung von Vorstellungen	g5 Methods to investigate notions	32	121

Liste der Publikationen in Teil I und Teil II	Lists of publications in part I and part II	Part I	Part II app.
g6 Untersuchungen zu Vorstellungen (von Schülern/Studenten)	g6 Investigations of (students') notions		
Bereich der Physik	Area of physics		
- Elektrizität	- electricity	41	124
- Wärme	- heat	49	125
- Mechanik	- mechanics	53	126
- Optik	- optics	65	129
- Atome/Teilchen	- atoms/particles	68	130
- Astronomie	- astronomy	71	131
- Energie	- energy	73	132
- Sonstige	- others	77	133
Bereich der Chemie	Area of chemistry	81	134
Bereich der Biologie	Area of biology	85	136
Sonstige	Others	89	143
g7 Unterricht unter Berücksichtigung von Vorstellungen der Schüler	g7 Instruction taking students' notions into account		
Bereich der Physik	Area of physics		
- Elektrizität	- electricity	95	145
- Wärme	- heat	97	145
- Mechanik	- mechanics	98	146
- Optik	- optics	100	148
- Atome/Teilchen	- atoms/particles	101	148
- Astronomie	- astronomy	102	148
- Energie	- energy	103	149
- Sonstige	- others	104	150
Bereich der Chemie	Area of chemistry	105	150
Bereich der Biologie	Area of biology	106	151
Sonstige	Others	107	153
g8 Untersuchungen zu Vorstellungen von Lehrern	g8 Investigations of teachers' notions	110	155
g9 Vorstellungen und Lehrerbildung	g9 Notions and teacher training	---	157

11

Reinders Duit: EINFÜHRUNG

(1) ZUM UMGANG MIT DER BIBLIOGRAPHIE

Zu den Zielen der Literatursammlung

Dem Forschungsgebiet "Alltagsvorstellungen und naturwissenschaftlicher Unterricht" wird seit etwa der Mitte der 70iger Jahre große Aufmerksamkeit gewidmet. Wir haben die Literatursammlung, die der vorliegenden Bibliographie zugrunde liegt, ursprünglich angelegt, um einen Überblick über das Forschungsfeld zu bekommen, d. h. um uns dort einzuarbeiten. Im Laufe der Zeit hat sich die heutige - recht umfangreiche - Literatursammlung ergeben. Sie hilft uns, einen Überblick über die immer noch schnell wachsende Zahl von Forschungsarbeiten zu behalten. Durch die Publikation der vorliegenden Bibliographie hoffen wir, interessierten Kollegen ebenfalls einen Überblick zu ermöglichen. Mit dieser Publikation verbinden wir die folgende Bitte:

Bitte schicken Sie uns Ihren neuen Artikel oder Arbeiten, die wir bislang noch nicht aufgenommen haben, insbesondere dann, wenn es sich um Arbeiten handelt, die nicht in leicht zugänglichen Publikationen (wie Zeitschriften, Sammelbänden und dergleichen) erschienen sind. Wir werden die Beiträge aufnehmen und in einer Ergänzungsliste oder einer Neuauflage berücksichtigen.

Leider müssen wir den folgenden Hinweis geben:

Zwar steht unsere Literatursammlung allen Kollegen offen, die uns am IPN besuchen. Es ist uns aber nicht möglich, Kopien von Publikationen anzufertigen, die in unserer Liste genannt sind. Bitte wenden Sie sich diesbezüglich immer an die Autoren!

Zu den Schwerpunkten der Bibliographie

Wie im Vorwort bereits erwähnt, dürfte die Bibliographie im Bereich der Physik am umfassendsten den Forschungsstand repräsentieren. Aber auch die Bereiche Chemie und Biologie scheinen inzwischen ausreichend dokumentiert zu sein.

Institute for Science Education
Institut für die Pädagogik der Naturwissenschaften

ED 315 266

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
● Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Bibliography

Students' Alternative Frameworks and Science Education

Bibliographie

Alltagsvorstellungen und naturwissenschaftlicher Unterricht

2. Edition 2. Auflage

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
T. Kapune
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

34

IPN Reports in Brief
IPN Kurzberichte

Untersuchungen zu "Vorstellungen" gibt es auch in anderen Fächern. Insbesondere die Mathematik ist dabei zu erwähnen. Die folgenden Tagungsbände geben einen ersten orientierenden Überblick:

Archenhold, W. F., Orton, A., Driver, R., Wood-Robinson, C. (Eds.): Cognitive Development. Research in Science and Mathematics. Proceedings of an International Seminar. Leeds: The University of Leeds, 1980

Helm, H., Novak, J. (Eds.): Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca: Cornell University, 1983

Novak J. (Ed.): Proceedings of the Second International Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol. I, II, III. Ithaca: Cornell University, 1987

Zum Aufbau der Literaturliste

Wir haben die aufgenommenen Arbeiten in neun Gruppen eingeteilt:

g1 Zum Umfeld des Problems "Vorstellungen"

Hier finden sich Arbeiten, die sich ganz allgemein mit Problemen des Forschungsgebietes befassen.

g2 Alltagsvorstellungen und wissenschaftliche Vorstellungen

Es geht in dieser Gruppe um Arbeiten, die sich speziell mit der Frage der Beziehungen zwischen Alltagsvorstellungen und wissenschaftlichen Vorstellungen beschäftigen.

g3 Geschichtliche und individuelle Entwicklung von Vorstellungen

Viele Untersuchungen zeigen, daß bei Schülern/Studenten heute Vorstellungen auftreten, die auch in der historischen Entwicklung der Wissenschaft eine Rolle gespielt haben. Die hier eingeordneten Arbeiten gehen der Frage nach, welche Bedeutung die historische Entwicklung für die individuelle Entwicklung haben kann.

g4 Sprache und Vorstellungen

Viele Vorstellungen haben ihren Ursprung in der Alltagssprache. Um diesen Problemkreis geht es hier.

g5 Methoden zur Erfassung von Vorstellungen

Wir haben hier solche Publikationen eingeordnet, die Untersuchungsmethoden diskutieren.

g6 Untersuchungen zu Vorstellungen(von Schülern/Studenten)

Dies ist die umfangreichste Gruppe. Nach Sachgebieten geordnet (s. weiter unten) finden sich hier Arbeiten, die Auskunft über Vorstellungen in verschiedenen Bereichen geben.
Seit Anfang 1987 unterscheiden wir zwischen Vorstellungen von Schülern und Studenten einerseits und Lehrern andererseits. Letztere werden unter g8 (s. weiter unten) aufgeführt. Bislang konnte diese Unterscheidung noch nicht auf die vor 1987 aufgenommenen Arbeiten ausgedehnt werden.

g7 Unterricht unter Berücksichtigung von Vorstellungen der Schüler

Es finden sich hier Untersuchungen, in denen Unterricht, der Schülervorstellungen explizit berücksichtigt, im Mittelpunkt steht. Auch hier werden die Arbeiten nach Sachgebieten geordnet.

g8 Untersuchungen zu Vorstellungen von Lehrern

Wie bereits unter g6 erwähnt, unterscheiden wir Untersuchungen zu Vorstellungen von Lehrern erst seit Anfang 1987. Wie bei g6 wird durch weitere Schlagwörter nach Sachgebieten unterschieden.

g9 Vorstellungen und Lehrerbildung

Diese Gruppe wird erst seit Anfang 1988 berücksichtigt. Sie kommt also - bislang - nur im zweiten Teil der vorliegenden Bibliographie (im Appendix) zur Anwendung. Zur Aufnahme dieser Gruppe führte eine Weiterentwicklung des Forschungsgebiets (dazu Näheres weiter unten). Es gibt zunehmend Vorschläge, welche Konsequenzen aus den empirischen Untersuchungen und theoretischen Überlegungen für die Lehrerbildung zu ziehen sind. Solche Vorschläge (sofern sie relativ konkret sind) und empirische Untersuchungen ihrer Wirkungen werden unter g9 eingeordnet.

Die Zuordnung von Beiträgen zu den einzelnen Gruppen ist nicht immer einfach. Wir hoffen aber, in den meisten Fällen, eine einigermaßen einleuchtende Zuordnung gefunden zu haben. Viele Beiträge sind in verschiedene Gruppen eingeordnet. Man erkennt dies bei den Zitaten daran, daß mehrere Schlagwörter (s. weiter unten) angegeben sind. Bei einem Forschungsfeld, das sich nach wie vor in der Entwicklung befindet, ist es sehr schwierig, ein Kategoriensystem zu finden, das für alle Entwicklungen offen ist, das sozusagen ohne Schwierigkeiten mitwächst.

Das vorstehend skizzierte Kategoriensystem der Gruppen g1 bis g7 erwies sich Anfang der 80iger Jahre als zweckmäßig. Neuere Entwicklungen im Forschungsfeld würden heute wohl zu einem etwas anderen System führen, wenn man es ganz neu entwerfen würde. Durch Ergänzungen aber versuchen wir, das System so zu erweitern, daß es jedenfalls den wichtigsten Aspekten auch des heutigen Forschungsstandes gerecht werden kann.

Schlagwörter

Die "Schlagwörter" g1 bis g9 kennzeichnen die vorstehend genannten neun Gruppen.

Für Arbeiten, die in die Gruppen g6, g7 und g8 eingeordnet sind, geben wir weitere Schlagwörter an. Diese betreffen zunächst die Fächer:

P: Physik
C: Chemie
B: Biologie

Findet sich bei den Publikationen der Gruppen g6, g7 und g8 keines dieser Schlagwörter, so handelt es sich entweder um eine Arbeit, in der Vorstellungen aller drei Fächer gleichermaßen eine Rolle spielen oder um eine Arbeit, die sich nicht speziell mit Vorstellungen eines der Fächer beschäftigt. Zu letzteren Arbeiten zählen z. B. solche, die sich mit übergreifenden Denkschemata, wie z. B. Kausalität, Reversibilität, Erhaltung oder Proportionalität, befassen.

Da die Anzahl der zur Physik erschienenen Arbeiten fast unüberschaubar groß geworden ist, haben wir dort die folgenden weiteren Untergliederungen vorgenommen.

E: Elektrizität
T: Wärme (Therm. Physik)
M: Mechanik (einschließlich der Mechanik der Flüssigkeiten und Gase sowie der Aggregatzustandsänderungen)
O: Optik
AT: Atome und Teilchen
AS: Astronomie (insbesondere Vorstellungen über die Erde und andere Himmelskörper im Weltall)
EN: Energie

Alle Arbeiten zur Physik, die nicht in diese Teilgebiete eingeordnet worden sind, erscheinen unter "g0, P (sonstige/others)". Um allzuviele Überschneidungen zwischen Chemie und Physik zu vermeiden, ordnen wir Untersuchungen zu Teilchen- und Atomvorstellungen der Physik zu und nicht auch noch der Chemie.
Einige weitere Schlagwörter zum Bereich Physik kennzeichnen weitere Gebiete bzw. Begriffe, die spiegeln weniger eine Systematik als vielmehr die Interessen der Ersteller der Bibliographie.

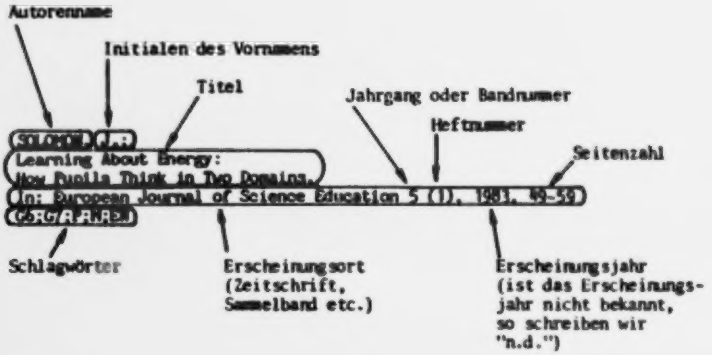
ENT: Entropie
FLD: Feld
INF: Information
IRR: Irreversibilität
MAG: Magnetismus
Q: Quantenphysik
R: Relativistische Physik
STAT: Statistische Physik
S: Schall

Seit Anfang 1988 werden weitere, allgemeine Schlagwörter verwendet:

CTL: Vorstellungen (Konzeptionen) des Lehr- und Lernprozesses.
Dieses Schlagwort kennzeichnet empirische Untersuchungen zu Vorstellungen (von Schülern/Studenten bzw. Lehrern) zum Lehren und Lernen.
CSC: Vorstellungen (Konzeptionen) zur "Natur" der Wissenschaften.
Erfaßt werden hier empirische Untersuchungen zu Vorstellungen von der "Natur und Reichweite" naturwissenschaftlicher Theorien und Erkenntnisse.
STS: Vorstellungen zum Nutzen naturwissenschaftlicher Kenntnisse und Verfahrensweisen im Raum der Technik und der Gesellschaft
GEN: Dieses Schlagwort kennzeichnet empirische Untersuchungen, in denen geschlechtsspezifische Unterschiede eine Rolle spielen.

Am Ende dieses Bandes findet sich eine Liste aller Schlagwörter.

Erläuterung der Zitate


Autorenname
Initialen des Vornamens
Titel
Jahrgang oder Bandnummer
Heftnummer
Seitenzahl
SOLOMON, J.:
Learning About Energy:
How Pupils Think in Two Domains.
In: European Journal of Science Education 5 (1), 1983, 49-59
Schlagwörter
Erscheinungsort
(Zeitschrift,
Sammelband etc.)
Erscheinungsjahr
(ist das Erscheinungsjahr nicht bekannt,
so schreiben wir
"n.d.")

Einige Hinweise auf Übersichtsartikel und Zusammenfassungen

Eine Bibliographie mit etwa 1 600 Literaturstellen ist für diejenigen, die sich in das Forschungsgebiet einarbeiten wollen, schwierig zu übersehen, auch wenn durch die Untergruppen und Schlagwörter bereits eine gewisse Strukturierung vorhanden ist. Im folgenden soll deshalb versucht werden, einige Hinweise auf Arbeiten zu geben, die sich - aus meiner Sicht - eignen, in das Forschungsfeld einzusteigen.

(a) Allgemeine Übersichten über das Forschungsgebiet

Driver, R., Erickson, G.: Theories-in-action: some theoretical and empirical issues in the study of students' conceptual frameworks in science. Studies in Science Education 10, 1983, 37 - 60

Gilbert, J., Watts, M.: Concepts, misconceptions and alternative conceptions: changing perspectives in science education. Studies in Science Education 10, 1983, 61 - 98

Hashweh, M.: Towards an explanation of conceptual change. European Journal of Science Education 8, 1986, 129 - 289

Duit, R.: Research on students' alternative frameworks in science – topics, theoretical frameworks, consequences for science teaching . In: Novak, J.: Proceedings the Second International Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol. I. Ithaca: Cornell University, 1987, 151 – 162

(b) Tagungsbände

Tagungsbände sind in besonderer Weise geeignet, einen Überblick über das Forschungsgebiet zu geben. Die drei oben bereits genannten Tagungsbände (Archenhold, u. a. 1980; Helm, H., Novak, J., 1983; Novak, J., 1987) dokumentieren die wohl größten Tagungen auf dem hier in Rede stehenden Forschungsgebiet. Sie spiegeln zugleich die Entwicklung des Gebietes.

(c) Bücher

Es gibt bereits eine Reihe von Büchern, in denen versucht wird, die wichtigsten Ansätze und Ergebnisse zusammenzufassen. Als Standortbestimmung für die weitere Planung des Forschungsgebietes diente z. B. der folgende Band:

Duit, R., Jung, W., Pfundt, H. (Hrg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981

Eine Zusammenfassung der wichtigsten Ergebnisse (vor allem im Bereich der Physik) und Grundideen des Forschungsgebietes für den Lehrer bietet ein Themenheft einer Zeitschrift:

Duit, R., Jung, W., Rhöneck, Ch. v. (Hrg.): Alltagsvorstellungen – Energie – Elektrik – Optik – Mechanik – Wärme – Teilchen – Stoff. Naturwissenschaften im Unterricht – Physik Chemie 34, 1986

Ebenfalls auf eine Zusammenfassung der Ergebnisse von Forschungsarbeiten (vor allem auf dem Gebiet der Physik) konzentriert sich:

Driver, R., Guesne, E., Tiberghien, A.(Eds.): Childrens' ideas in science. Milton Keyne: Open University Press, 1985

Etwas allgemeiner angelegt sind die folgenden beiden Bände:

Osborne, R., Freyberg, P.(Eds.): Learning in Science. The implication of children's science. Auckland, London: Heinemann, 1985

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel, Paris: Delachaux & Niestle, 1987

(d) Zusammenfassung von Untersuchungen zu Vorstellungen in einzelnen Gebieten

Lehrer, Lehrbuchautoren und Entwickler von Curriculummaterialien werden vor allem daran interessiert sein, zu erfahren, mit welchen Vorstellungen in bestimmten Bereichen (z.B. beim elektrischen Stromkreis) zu rechnen ist. Die Untergliederung der Gruppe "g6" bietet den Zugang zu allen in der Bibliographie vertretenen Arbeiten zu dem betroffenen Gebiet. Zu einigen Gebieten gibt es auch Zusammenfassungen.

Das unter (c) genannte Themenheft "Alltagsvorstellungen" faßt Ergebnisse zu den Gebieten Energie, Elektrik, Optik, Mechanik, Wärme und Teilchen zusammen. Im ebenfalls unter (c) genannten Band von Driver u. a. finden sich Zusammenfassungen zu den Gebieten Optik, Elektrik, Wärme, Mechanik (Kraft und Bewegung), Teilchen und Astronomie. Eine weitere gute Übersicht zum Gebiet "Kraft und Bewegung" bietet:

McDermott, L.: Research and conceptual understanding in mechanics. Physics Today, July 1984, 24 - 32

Im deutschem Sprachraum wäre ein Abschnitt der folgenden Arbeit zu nennen:

Schecker, H.: Das Schülerverständnis zur Mechanik. Dissertation, Universität Bremen, 1985

Über Untersuchungen im Bereich der Elektrizitätslehre informiert umfassend ein Tagungsband:

Duit, R., Jung, W., Rhöneck, Ch. v. (Hrg.): Aspects of understanding electricity. Kiel: IPN, 1985

Leider gibt es weder im Bereich der Chemie noch im Bereich der Biologie meines Wissens zur Zeit ähnliche Zusammenfassungen zu einzelnen Teilgebieten. Dort bleibt also nur der Zugang über die Bibliographie unter "g6, C" bzw. "g6, B".

(2) TRENDS IM FORSCHUNGSGEBIET "VORSTELLUNGEN UND NATURWISSENSCHAFTLICHER UNTERRICHT"

Zu dem, was mit "Vorstellungen" gemeint ist

Im Titel der vorliegenden Bibliographie sowie in dieser Einführung wird ganz bewußt ein recht vager Terminus, nämlich Vorstellungen, verwendet. Alltagsvorstellungen sind dabei solche, die ihren Ursprung in Alltagserfahrungen haben. Im deutschen Sprachraum sind einige weitere Termini vorgeschlagen worden, so z. B. Konzept oder Vorverständnis. Durchgesetzt hat sich keiner dieser Termini. Im internationalen Raum gibt es eine sehr große Zahl weiterer Termini (z.B. alternative frameworks, misconceptions, conceptions, notions, belief systems und viele andere). Diese Termini sind keineswegs gleichbedeutend, sie kennzeichnen vielmehr spezielle Aspekte des Gesamtfeldes im Rahmen bestimmter theoretischer Konzeptionen (s. dazu meine Übersicht in Duit, 1987, Proceedings Ithaca, app. g1; S. 114). Die große Zahl von Termini signalisiert eine Theorievielfalt im Forschungsgebiet. Dies wäre positiv betrachtet. Eher negativ betrachtet, ist unverkennbar, daß es bislang lediglich Ansätze zu übergreifenden Theoriebildungen gibt. Die Verwendung eines so vagen Terminus wie "Vorstellung" kann deshalb auch als Ausdruck einer gewissen Theorielosigkeit (wenn man eine übergreifende Theorie im Auge hat) angesehen werden.

Unverkennbar ist selbstverständlich ein breiter Konsensbereich der unterschiedlichen theoretischen Ansätze. Ansonsten hätte sich das Forschungsgebiet gar nicht herausbilden können. Es geht dabei um die folgende Auffassung vom Lernen. Lernen wird nicht als ein passives Übernehmen von Wissen angenommen. Lernen wird vielmehr als sehr aktiver Prozeß gesehen - als Prozeß, bei dem der Lernende aktiv sein Wissen selbst konstruieren muß, auf der Basis der Vorstellungen (Konzepte, ...), die er bereits vorher erworben hat. Diese bereits erworbenen Vorstellungen, d. h. diese bereits in der kognitiven Struktur abgespeicherten geistigen Entwürfe, spielen eine ganz zentrale Rolle im Lernprozeß. Sie beeinflussen die Interpretation der sinnlichen Wahrnehmungen und deren Weiterverarbeitung. Die vorstehend ganz kurz (und sicherlich in mancher Hinsicht auch verkürzt) dargestellte Auffassung vom Lernen ist die Grundidee, die im Durchschnitt aller Ansätze im Forschungsgebiet liegt.

Zur Entstehung des Forschungsgebiets in der Mitte der 70er Jahre

Diese Grundidee ist keineswegs neu. Sie liegt z. B. Ausubels pädagogischer Psychologie zugrunde, kann aber weit in die Geschichte der Pädagogik und des naturwissenschaftlichen Unterrichts zurückverfolgt werden (s. Jung, 1986, gl; S. 11). Etwa seit Beginn des 20. Jahrhunderts gibt es auch ein Interesse, die Vorstellungen der Schüler im Bereich der Naturwissenschaften kennenzulernen. Piagets Arbeiten sind hier natürlich als *der* Meilenstein zu nennen. Zu erinnern ist im deutschen Sprachraum auch an die Kette von Arbeiten im Bereich der Naturlehre, die beginnend mit Banholzer und Zietz in den 30iger Jahren, allerdings unterbrochen durch den 2. Weltkrieg, bis zur großen Bildungsreform Ende der 60iger Jahre reichen.

Seit etwa der Mitte der 70iger Jahre gibt es – weltweit (wobei dies vor allem für die sogenannte "westliche Welt" gilt) – geradezu einen Boom von Forschungsarbeiten. Es scheint so zu sein, daß ein Zusammentreffen der Interessen zweier Gruppen den entscheidenden Anstoß für diese Forschungsarbeiten gegeben hat. Zu den Initiatoren zählen nämlich einerseits Fachdidaktiker, also Personen, denen es um die Verbesserung des Unterrichts ging. Die Curriculumbewegung der 60iger und frühen 70iger Jahre hatte nicht den durchschlagenden Erfolg gebracht, den man sich erhofft hatte. Die Orientierung an den wesentlichen Konzepten der Wissenschaften ("structures of the discipline") hatte jedenfalls nicht dazu geführt, Lernprobleme wesentlich zu mindern. Nach wie vor erwies es sich als äußerst schwierig, die Schüler von ihren vorunterrichtlichen Vorstellungen zu den wissenschaftlichen zu führen. Auf der anderen Seite waren es Vertreter der Kognitionspsychologie, die sich vom bislang beherrschenden behavioristischen Ansatz lösten. Dieser war eher der oben skizzierten "passiven" Sicht des Lernprozesses zuzuordnen, die neuen Ansätze dagegen der "aktiven". Die Interessen beider Gruppen trafen sich, es kam zu mannigfältigen Kooperationen. Die Schwerpunkte der Forschungen lagen in der Untersuchung von

"Vorstellungen". Die Fachdidaktiker waren daran interessiert, zunächst einmal die Vorstellungen in den wichtigsten naturwissenschaftlichen Gebieten festzustellen, die die Schüler in den Unterricht mitbringen und die Veränderung dieser Vorstellungen im Verlaufe des Unterrichts zu verfolgen. Die kognitionspsychologisch ausgerichteten Forschungen waren ganz allgemein an der Rolle der Vorstellungen beim Lernen bzw. beim Problemlösen interessiert. Naturwissenschaftliche (vor allem physikalische) Sachgebiete erwiesen sich als sehr geeignetes Forschungsfeld. Der Schwerpunkt der Forschungsarbeiten lag also zunächst in der Gruppe, die im Rahmen der vorliegenden Bibliographie mit "g6: Untersuchungen zur Vorstellungen" bezeichnet wird.

Weiterentwicklung I: Untersuchungen zu Vorstellungen (g6)

Der Gruppe g6 gehört nach wie vor der größte Teil der Forschungsarbeiten an. Die Physik ist immer noch der dominierende Bereich, obwohl unverkennbar ist, daß auch in der Biologie derzeit sehr viele Forschungsarbeiten laufen. Das Feld scheint insgesamt noch keineswegs ausreichend durchforscht zu sein. Dies gilt sogar für die Physik. Zwar gibt es dort einige Gebiete (z. B. "Kraft und Bewegung" und "elektrischer Stromkreis") auf denen man schon von einer Überfülle von Arbeiten sprechen kann. Es gibt aber auch wichtige Gebiete, über die man fast gar nichts weiß. Dies gilt erstaunlicher Weise für so elementare Gebiete wie Schall und Magnetismus (vgl. g6, P und app.g6, P) wie auch für die sogenannte "moderne" Physik. Es besteht also weiterhin Bedarf für Untersuchungen zu Vorstellungen. Die Bibliographie könnte helfen, "weiße Flecken" auf der Landkarte der Vorstellungen zu entdecken und zu beseitigen.

Weiterentwicklung II: Konsequenzen für den Unterricht

Zunehmend befaßt man sich nicht allein mit der "Erhebung" von Vorstellungen und mit der Konstatierung, daß diese im herkömmlichen Unterricht schwer zu verändern sind. Untersuchungen, in denen Konsequenzen aus den vorstehend genannten Resultaten nicht nur theoretisch entworfen, sondern auch empirisch untersucht werden, nehmen einen immer größeren Raum ein. In der Bibliographie erkennt man es daran, daß auch die Anzahl der Untersuchungen unter "g7: Unterricht unter Berücksichtigung von Vorstellungen der Schüler" stark zunimmt.

Die wichtigsten "Maßnahmen", die zur Verbesserung des Unterrichts entwickelt werden, scheinen mir die folgenden zu sein (s. etwas ausführlicher in Duit, 1987, Proceedings Ithaca, app. g1; S. 114).

- Die Sachstruktur des Unterrichts wird geändert.
- Neue Lehr- und Lernhilfen (neue Lehrbücher, neue Experimente, insbesondere auch neue Computerprogramme) werden entwickelt.
- Neue Lehrstrategien werden erprobt. Dabei handelt es sich nicht immer um "wirklich" neue Strategien. Es finden sich dort auch einige "alte Bekannte", die man bislang z. B. unter "entdeckendem Lernen" eingeordnet hatte.
- Strategien des Meta-Learning werden eingesetzt, d. h. es wird versucht, den Schüler zu einer neuen "Vorstellung" von seinem Lernprozeß zu führen (s. dazu auch weiter unten).
- Es wird versucht, Lehrer vom "neuen" Bild des Lernens (also der oben skizzierten "aktiven" Sicht) zu überzeugen, um dadurch anderes Lehrverhalten zu erzielen.

Weiterentwicklung III: Von Vorstellungen über naturwissenschaftliche Phänomene, Begriffe und Theorien zu Vorstellungen über die Natur und Reichweite wissenschaftlicher Wissensbestände sowie über den Lernprozeß

Wie erwähnt, startete das Forschungsgebiet Mitte der 70iger Jahre mit Untersuchungen der Vorstellungen von Schülern bzw. Studenten über naturwissenschaftliche Phänomene, Begriffe und Theorien. Inzwischen nimmt man weitere "Vorstellungen", die das Erlernen bestimmen, in den Blick. Dazu zählen zunächst einmal Vorstellungen zur "Natur und Reichweite" naturwissenschaftlicher Wissensbestände. Es ist einleuchtend, daß das "Bild der Naturwissenschaften", das sich ein Schüler macht, beeinflußt, wie er/sie Naturwissenschaften lernt.
Einen weiteren Schritt zu sehr allgemeinen Vorstellungen, die Lernen beeinflussen, geht man mit der Erforschung des Einflusses des "Bildes", das sich Schüler vom eigenen Lernen machen. Wer z. B. Lernen vorwiegend als Einfüllen von Lehrstoff

ansieht, den der Lehrer bzw. ein Lehrbuch präsentiert, lernt entsprechend, d. h. nimmt eine Haltung ein, die weiter oben als "passiv" bezeichnet worden ist. Schließlich werden auch die Einstellungen und Interessen der Schüler sowohl zu naturwissenschaftlichen Wissensbeständen wie auch zum Lernen insgesamt in den Blick genommen.

Während ursprünglich der Schüler bzw. Student (also der Lernende) fast ausschließlich im Blickpunkt stand, wird zunehmend versucht, auch die Vorstellungen der Lehrer zu berücksichtigen. Dabei handelt es sich um Vorstellungen in der gleichen Breite, wie sie heute beim Schüler berücksichtigt werden.

Die hier skizzierten Ausweitungen des Forschungsgebietes dürften sehr tiefgreifend sein. Sie ergeben sich einerseits zwingend aus dem Grundansatz, daß Lernen ein aktiver Konstruktionsprozeß auf der Basis der bereits erworbenen "Vorstellungen" (Konzepte, Einstellungen, Interessen) ist. Sie können das Arbeitsgebiet aber andererseits zu einem Punkt führen, an dem die Komplexität des untersuchten Feldes nicht mehr zu bewältigen ist. Die Ausweitungen haben ja von einer Reduktion auf einen wichtigen Aspekt zu immer größerer Komplexität geführt. Es wird nunmehr in vielen Ansätzen versucht, die "volle" Komplexität des Unterrichts in den Blick zu nehmen. Es muß abgewartet werden, ob dies gelingt.

Weiterentwicklung IV: Die theoretischen Ansätze

Die Fachdidaktiker im deutschsprachigen Raum, die Mitte der 70iger Jahre das Forschungsgebiet initiierten, standen in einer langen Tradition, nämlich im Unterricht dort anzufangen, wo sich der Schüler befindet. Dies bedeutete auch, die Vorstellungen der Schüler angemessen zu berücksichtigen. Ähnliche Traditionen hat es in anderen Ländern sicher ebenfalls gegeben. Eine weltweit beachtete und akzeptierte Neuformulierung dieser Traditionen hat Ausubel gegeben. Sein Dictum "The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly" wurde und wird wohl auch heute von den meisten Forschern als zentraler Aspekt der Arbeit akzeptiert.

Interessant ist es, die Rolle Piagets zu betrachten. Sie war nämlich durchaus zwiespältig. Auf der einen Seite standen alle Forscher sozusagen auf den Schultern von Piaget. Ohne seine theoretischen Ansätze, ohne seine grundlegenden Untersuchungen und ohne seine Interviewtechniken wären viele Unternehmungen sicher ganz anders verlaufen. Auf der anderen Seite aber setzte sich das neue Forschungsgebiet ganz bewußt von Piaget ab. Man war - jedenfalls sehr häufig - der Auffassung, daß die "inhaltlichen" naturwissenschaftlichen Vorstellungen (z. B. zum Sehen, zur Wärme, zum Begriff des Tieres) eine größere Bedeutung für den Lernprozeß haben, als die sehr allgemeinen Denkoperationen nach Piaget. Die Auseinandersetzungen zwischen "Piagetians" und "Alternative Frameworkers" wurden eine Zeit lang sogar mit beträchtlicher Schärfe geführt. Es hat den Anschein, daß sich heute eine vermittelnde Position durchgesetzt hat. Es wird jedenfalls meist anerkannt, daß beide Gesichtspunkte, nämlich "allgemeine Denkoperationen" wie "Vorstellungen" eine wichtige Rolle spielen.

Die zweite oben genannte Gruppe der Initiatoren des Forschungsgebietes, nämlich Vertreter der Kognitionspsychologie, haben wichtige theoretische Ansätze in das Forschungsgebiet eingebracht. Netzwerktheorien und Theorien der Informationsverarbeitung mit dem Computer als leitendes Paradigma sind hier beispielsweise zu nennen.

Zweifellos haben wissenschaftstheoretische Ansätze, die mit den Namen von Hanson, T. S. Kuhn, Lakatos und Feyerabend verbunden sind, einen ganz wesentlichen Einfluß gehabt. Auch sie haben ganz entscheidend dazu beigetragen, daß sich das Forschungsgebiet bildete und schnell wuchs. Dies ist auch gar nicht erstaunlich, denn schließlich spielt in diesen Ansätzen die Idee eine zentrale Rolle, daß alle Erkenntnis "theoriegeleitet", d. h. geleitet durch die herrschenden Vorstellungen ist.

Die starke Aufmerksamkeit, die Forschung auf dem hier in Rede stehenden Gebiet seit der Mitte der 70iger Jahre gewidmet wird, geht also nicht zuletzt auch darauf zurück, daß wichtige Strömungen wissenschaftlichen Denkens aufgenommen und weitergeführt wurden. Die Forschungen lagen - so betrachtet - "im Trend der Zeit". Es sind selbstverständlich nicht allein die genannten wissenschaftstheoretischen

Positionen "verarbeitet" werden. Beeinflußt ist das Forschungsgebiet mittelbar auch durch neues naturwissenschaftliches Denken, das durch das Schlagwort der Selbstorganisation offener Systeme hier nur kurz gekennzeichnet werden kann. Dieses "Denken" seinerseits hat nämlich vielfältige Beziehungen zu Ansätzen der Künstlichen Intelligenz. In die skizzierten Strömungen fügt sich die "Wiederentdeckung" konstruktivistischer Ansätze nahtlos ein. Sie haben für das Forschungsgebiet "Vorstellungen und naturwissenschaftlicher Unterricht" eine große Bedeutung erhalten – jedenfalls im internationalen Raum.

Etwa seit Beginn der 80iger Jahre werden konstruktivistische Ansätze für das Forschungsgebiet ganz explizit nutzbar gemacht. Dies gilt in großer Breite. Einerseits nämlich geht es um persönlichkeitstheoretische Ansätze (wie z. B. von G. Kelly), andererseits um sozialpsychologische Ansätze (wie z. B. von Vygotsky). So fruchtbar die Einbeziehung solcher konstruktivistischen Ansätze auch ist, so gibt es doch einen unübersehbaren Trend im Forschungsgebiet, der mit aller Vorsicht und Skepsis zu sehen ist, nämlich die Arbeiten im gesamten Gebiet in Bausch und Bogen nunmehr mit dem Wort konstruktivistisch zu belegen. Denn allzuhäufig verbirgt sich hinter diesem "Label" kaum mehr als die oben skizzierte "aktive" Sicht des Lernens. Diese Idee ist aber zu allgemein, um als theoretische Grundlegung des gesamten Gebiets fruchtbar werden zu können.

Das Forschungsgebiet in den nächsten Jahren

Es ist nicht allzu schwierig, die Weiterentwicklung des Forschungsgebietes in den nächsten zwei bis drei Jahren vorauszusagen. Viele Arbeiten laufen bereits, deren Ergebnisse in diesem Zeitraum vorliegen werden. Die vorstehend umrissenen Trends dürften die kurzfristige Entwicklung weitgehend bestimmen. Voraussagen, die darüber hinausgehen, sind allerdings sehr schwierig. Nicht zu übersehen ist aber, daß das Forschungsgebiet ganz ähnlich wie die Curriculumbewegung der 60iger und 70iger Jahre in eine gewisse Resignation münden und deshalb irgendwann relativ abrupt abbrechen könnte. Ich sehe Anzeichen für eine solche Entwicklung in den Resultaten der vielen Bemühungen, die Schüler zu den wissenschaftlichen Vorstellungen zu führen. Die "Erfolge" dieser Bemühungen sind nicht immer völlig überzeugend. Zwar gibt es sehr ermutigende Resultate, aber bislang sind die grundsätzlichen Schwierigkeiten nicht überwunden worden. Es gilt, aus diesen Resultaten die richtigen Schlüsse zu ziehen. Unter diesen Schlüssen wäre auch zu diskutieren, inwieweit der naturwissenschaftliche Unterricht ganz grundlegend verändert werden muß. Bislang nämlich sind Schlüsse für die Zielsetzungen des Unterrichts nicht auf sehr grundsätzlicher Ebene gezogen worden. Nach wie vor bemüht man sich eher, die Schwierigkeiten, die dem Erreichen der "klassischen" Ziele im Wege stehen, zu beseitigen oder zu umgehen.

Wenn die vorliegende Bibliographie (und ihre geplanten Ergänzungen) mithelfen könnten, daß die Diskussionen über die "richtigen" Schlüsse für den naturwissenschaftlichen Unterricht auf der Basis des heute verfügbaren Forschungswissens geführt werden, so hätte sie ein wichtiges Ziel erreicht.

Reinders Duit: INTRODUCTION

(1) HOW TO USE THE BIBLIOGRAPHY

Aims of our collection of literature

Considerable attention has been paid to research on students' notions (students' conceptions) since the middle of the 1970s. We began collecting papers when starting research in this field some 15 years ago. We wanted to form a comprehensive picture of what had already been done in order to avoid "inventing the wheel" another time. We have kept on collecting papers because we feel this to be the best way to keep track of what is going on in a rapidly expanding research field. We hope that the present bibliography may help colleagues to keep an eye on developments, or to form an initial impression when starting research.

We would like to accompany the bibliography with a request:

Please send your new articles or articles not contained in the bibliography so far, especially articles which are not published in journals, proceedings, books or the like. We will add your contributions to a supplementary or new edition of the present bibliography.

Unfortunately, we must draw your attention to the following:

Although our collection of literature may be used by anyone who visits the IPN, it is not possible for us to make copies of publications named in our lists. In this case please contact the authors themselves.

The main emphasis of the bibliography

As mentioned in the foreword the bibliography is probably most comprehensive for research in the area of physics. But with the addenda, research on biology and chemistry instruction is now also documented more adequately.

Research on students' notions is not only carried out in science. For mathematics in particular many interesting papers are available. The following proceedings may provide a valuable access to this field of research:

Archenhold, W. F., Orton, A., Driver, R., Wood-Robinson, C. (Eds.): Cognitive Development. Research in Science and Mathematics. Proceedings of an International Seminar. Leeds: The University of Leeds, 1980

Helm, H., Novak, J. (Eds.): Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca: Cornell University, 1983

Novak J. (Ed.): Proceedings of the Second International Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol. I, II, III. Ithaca: Cornell University, 1987

The structure of the bibliography

We have divided the works into nine groups:

g1 General considerations concerning research in this area

This comprises works which deal quite generally with this field of research.

g2 Everyday notions and scientific notions

This group deals specifically with relations between everyday notions and scientific notions.

g3 Development of notions in the history of science as compared to development of notions in individuals

Many studies have shown that notions occur among pupils today which also played a role in the historical development of science. The works assigned to this group investigate the significance of historical development for the development of notions in the individual.

g4 Language and notions

Many notions originate in everyday language, a problem area investigated here.

g5 Methods of investigation

To this group we have assigned publications which discuss methods of investigation.

g6 Investigations of (students') notions

This is by far the largest group and contains works which give information on notions in various areas. The works are divided into thematic areas (see below). Since the beginning of 1987 we have differentiated between notions of students and teachers. Studies on teachers notions are now in their own group (see g8 below). Studies on notions put into the bibliography before 1987 have not been differentiated so far.

g7 Instruction taking students' notions into account

This group comprises investigations concentrating on instruction in which students' notions are taken into account. Again the works are divided into thematic areas.

g8 Investigations of teachers notions

As mentioned we have differentiated between studies on students' and teachers' notions only since the beginning of 1987. As is also the case in g6 the works are divided into thematic areas.

g9 Notions and teacher training

This group has been included only since the beginning of 1988. It is, therefore, regarded only in the second part of the present bibliography (in the appendix). Trends in the research field described later forced us to open this new group. There is a growing number of papers on consequences of students' conceptions research on teacher training. Such papers are put into g9 if the proposals are specific or if empirical studies of the impact of such proposals are reported.

It is not always easy to assign a particular work to a particular group. We hope, however, that in most cases the most obvious group has been chosen. Many contributions are assigned to several groups and are therefore accompanied by several keywords (see below).

In a research area still in rapid progress it is rather difficult to find a system of classifying categories which is open to new trends. The system of the groups g1 to g7 appeared to be suited for this purpose in 1980. Difficulties have more recently occurred which we have tried to compensate for by opening two further groups and by adding further keywords (see below). We hope that the enlarged system of groups and keywords is suited to cover at least the main aspects of the present research field.

Keywords

The "keywords" g1 to g9 represent the above mentioned nine groups.

For works assigned to the groups g6, g7 and g8 we indicate further keywords. These apply first to the subjects:

P: physics
C: chemistry
B: biology

If a publication in group g6, g7 or g8 is not followed by one of these keywords, it does not deal specifically with notions for one of the subjects. Publications of this type include those which deal, for example, with general thought schemata such as causality, reversibility, conservation or proportionality.

As a vast amount of publications are available for the area of physics, we have introduced the following subdivisions:

E: electricity
T: heat (thermal physics)
M: mechanics (including mechanics of liquids and gases as well as changes of state of matter)
O: optics
AT: atoms and particles
AS: astronomy (including notions of the earth and other bodies in the universe)
EN: energy

Those works which are not included in any of these subcategories are to be found under "others".
To avoid too many overlaps between chemistry and physics we assign studies on notions concerning particles and atoms to the area of physics alone.

There are a number of further keywords indicating further areas or concepts. They are not intended as a systematic catalogue, but rather as a reflection of the compilers' interests.

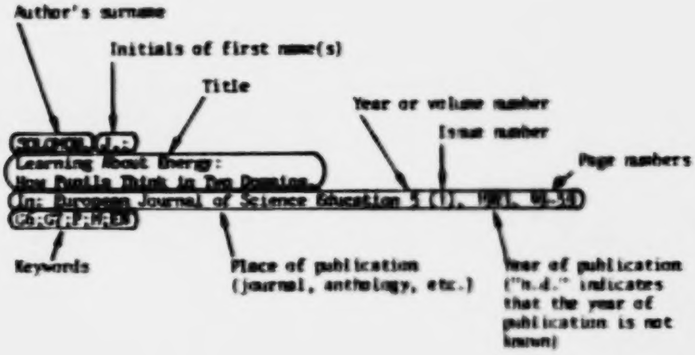
ENT: entropy
FLD: field
INF: information
IRR: irreversibility
MAG: magnetism
Q: quantum physics
R: relativistic physics
STAT: statistical physics
S: sound

Since the beginning of 1988 some other keywords have been included:

CTL: Conceptions of the teaching and learning process.
This keyword emphazises empirical investigations on conceptions (of students or teachers) on teaching and learning.
CSC: Conceptions (on the "nature and range") of science.
This keyword is used for empirical studies in which conceptions of science play a role.
STS: Conceptions on the use of science for technology and society.
Under the heading of "STS" much research and development work is carried out on the use of science outside science. Empirical studies investigating notions of such uses in technology and society are marked by the keyword STS.
GEN: Empirical studies in which gender differences are investigated are marked by GEN.

Please note that these keywords were only recently introduced. They are regarded only in part II of the bibliography (i. e. in the appendix). On the last pages of this bibliography the list of all keywords is given.

Explanation of the entries


Author's surname
Initials of first name(s)
Title
Year or volume number
Issue number
Page numbers
SOLOMON, J.:
Learning About Energy:
How Pupils Think in Two Domains.
In: European Journal of Science Education 5 (1), 1983, 49-59
Keywords
Place of publication (journal, anthology, etc.)
Year of publication ("n.d." indicates that the year of publication is not known)

Some hints on reviews and summaries

The present bibliography contains some 1 600 quotations. Users who are not so familiar with the research area and who want to get access to it may be troubled by the large number of articles. In order to make this abundance easier to handle some hints on review articles and on other summarizing publications are given in the following. Please keep in mind that the following selection has been made from my point of view. Although I have endeavoured to avoid onesidedness, there may still be some omissions.

(a) Reviews of the research area

Driver, R., Erickson, G.: Theories-in-action: some theoretical and empirical issues in the study of students' conceptual frameworks in science. Studies in Science Education 10, 1983, 37 - 60

Gilbert, J., Watts, M.: Concepts, misconceptions and alternative conceptions: changing perspectives in science education. Studies in Science Education 10, 1983, 61 - 98

Hashweh, M.: Towards an explanation of conceptual change. European Journal of Science Education 8, 1986, 229 - 249

Duit, R.: Research on students' alternative frameworks in science - topics, theoretical frameworks, consequences for science teaching . In: Novak, J.: Proceedings the Second International Seminar "Misconceptions and Educational Strategies in Science and Mathematics". Vol. I. Ithaca: Cornell University, 1987, 151 - 162

(b) Proceedings of conferences

Proceedings of the main conferences provide very valuable insight into research if papers are printed in full length. This is the case with the proceedings already mentioned above (Archenhold et al. 1980; Helm, Novak, 1983; Novak, 1987). At the same time these proceedings appear to mirror the development of the research area quite appropriately.

(c) Books

There are some books available in which the main approaches and results are summarized.

In Germany the following volume provided frameworks for planning research in our field:

Duit, R., Jung, W., Pfundt, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981

A summary of research findings (mainly in the area of physics) as well as of main ideas of the research field has been worked out within the issues of a German teachers' journal:

Duit, R., Jung, W., Rhöneck, Ch. v. (Hrsg.): Alltagsvorstellungen - Energie - Elektrik - Optik - Mechanik - Wärme - Teilchen - Stoff. Naturwissenschaften im Unterricht - Physik/Chemie 34, 1986

In English the following book provides a summary of research findings in a couple of thematic areas (also mainly physics areas):

Driver, R., Guesne, E., Tiberghien, A.(Eds.): Childrens' ideas in science. Milton Keynes: Open University Press, 1985

A somewhat more general overview is provided by:

Osborne, R., Freyberg, P.(Eds.): Learning in Science. The implications of children's science. Auckland, London: Heinemann, 1985

In French the following book based on research results is available:

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchâtel, Paris: Delachaux & Niestlé, 1987

(d) Summaries of research results on conceptions in thematic areas

Teachers, textbook authors and other developers of teaching and learning materials will be interested in students' conceptions in specific thematic areas (e.g. electric circuit, combustion, chemical reactions, genetics). The subdivisions of §8 in the present bibliography facilitate access to articles of interest. In a couple of areas summaries are available.

The above mentioned (s. (c)) issue of a German journal "Alltagsvorstellungen" provides summaries of students' notions on energy, electricity, optics, mechanics (especially force and movement), heat and particle model. In the book by Driver et al. also mentioned above (s. (c)) there are summaries of the areas of light, electricity, heat, mechanics (force and movement), particle model and astronomy. Another very valuable summary of conceptions in the area of mechanics is provided by:

McDermott, L.: Research and conceptual understanding in mechanics. Physics Today, July 1984, 24 - 32

In German a summary of the same area is contained in:

Schecker, H.: Das Schülerverständnis zur Mechanik. Dissertation Universität Bremen, 1985

On electricity a conference was held in 1984. The proceedings provide a summary of this area:

Duit, R., Jung, W., Rhöneck, Ch. v. (Hrg.): Aspects of understanding electricity. Kiel: IPN, 1985

Summaries of thematic areas of chemistry and biology do not appear to be available so far. Of course, the latest papers on a thematic area usually try to summarize findings of proceeding studies. To gain access to such articles the subdivisions "g8, C" and "g8, B" will help.

(3) REMARKS ON TRENDS IN THE RESEARCH AREAS "STUDENTS' NOTIONS AND SCIENCE EDUCATION"

On the many labels used to indicate students' notions

Many labels are used to indicate what is called students' notions, students' conceptions or students' alternative frameworks in this bibliography (e. g. misconceptions, students' science, mini theories, belief systems). The most "neutral" terms appear to be students' conceptions and students' notions simply indicating mental representations of the outside world. The label "alternative framework" used in the title of the bibliography stands for a program accepted by the overwhelming majority of researchers in our field. This is a program which views students' conceptions as conceptions in their own right and not as false ideas which have to be erased as fast as possible (quite often the label misconception indicates the latter position). The labels used, therefore, stand for somewhat or quite considerably different positions (s. the overview in Duit, 1987, Proceedings Ithaca, app. gl; p. 114). They are embedded in different theoretical frameworks. The large number of labels used indicates, therefore, that manifold theoretical approaches are employed in the research area. So far, no "unifying" theory appears to be in sight.

Of course, there is much concurrence among the manifold theoretical approaches despite the differences. The unifying basic idea is the following view of the learning process. Learning is *not* viewed as a passive taking over (filling in) of knowledge. Learning is viewed as a very active process. It is a process in which the learner has to construct actively his/her knowledge on the basis of the conceptions already present in the cognitive structure. These pre-conceptions play a decisive role in the learning process. They guide interpretation of sense impressions and the process of planting new pieces into the already existing cognitive structure.

Why did the research area start in the middle of the 1970s and grow so rapidly?

The "active" view of learning we have just sketched is by no means a new one. It can be traced back far into the history of pedagogy and science instruction (see a German perspective in Jung, 1984, gl; p. 11). Since the beginning of the 20th century there have been not only thoughts in accordance with the "active" view but also empirical studies on students' conceptions of science phenomena. Of course, Piagets' seminal work has to be mentioned here. But there are many other "early" studies too (see e.g. the review of Oakes, 1947, gl., p. 16).

Since the middle of the 1970s there has been a boom of research on students' conceptions in science - mainly in the "western" world. The start and the rapid growth of research appears to be due to the fact that the interests of science educators and cognitive psychologists met. On the one hand science educators were not too pleased with the outcomes of the curriculum movement in the 1960s and early 1970s. Despite many efforts (e.g. new experiments, new curriculum materials) and orientation to the structures of the disciplines students still had severe difficulties in learning science concepts and theories. The new curricula were not as successful as expected in guiding students from their (everyday) conceptions to the science ones. Science educators, therefore, felt a need to study the role of pre-conceptions in learning science conceptions in more detail.

On the other hand cognitive psychologists tried to overcome the behavioristic view of learning which had dominated so far. The behavioristic view was close to the above mentioned "passive" view, the new cognitive psychology was in accordance with the "active" view.

The interests of the two groups met insofar as they both were interested in the role of pre-conceptions. Science educators wanted to find out the main pre-conceptions which have to be regarded along the students' path to the science conceptions. Cognitive psychologists wanted to investigate the role of pre-conceptions in the process of learning and problem solving in a very general manner. Science topics (especially physics topics) turned out to be well suited for this purpose. In the beginning, the main emphasis of research was in "g0 investigations of notions" according to the interests mentioned above.

Further development of "g0 investigations of notions"

Most research carried out still falls into the group "g0". Physics still is the dominating area, although there has recently been a considerable increase in studies in the area of biology. Although much research is available on students' conceptions (see g0 and app. g6 in this bibliography) there are still important areas in which almost nothing is known. This is even true for physics. There are, of course, some areas in which an abundance of studies is available (at the moment, for instance, there appears to be no need for further studies on "force and movement"). But there are, quite surprisingly, basic areas such as sound and magnetism in which only a very limited number of studies has been done. I think therefore, that there is still a need for further studies on students' conceptions. The bibliography may be helpful in order to detect areas in which research is missing so far.

Trend I: From studies on conceptions to studies on the impact of newly developed teaching materials and teaching strategies

As we mentioned above, studies on students' preconceptions and their changes during instruction predominated at the start of the research area and still play an important role. But there is a growing number of studies investigating the impact of new approaches as to overcome the difficulties indicated by the studies in "g6". This trend is obvious when comparing the first edition (1985) and the present edition (1988) of the bibliography. The number of quotations in "g7 Instruction taking students' notions into account" has increased considerably.

There are several kinds of consequences drawn in the approaches available. The most important ones appear to be the following:

- Content structure of instruction is changed, i. e. the setup of content is altered in order to meet students' difficulties.
- New teaching materials (new textbooks, new experiments, new computer programs and others) are developed.
- New teaching strategies are developed (e. g. so called constructivistic strategies). Of course, among the strategies proposed some "old friends" (such as socratic dialogue) are to be found.
- Strategies of meta-learning are employed in order to guide students to a new view of their learning process (see below for more remarks on this).
- Teachers' view of learning and teaching is altered in order to guide teachers from the still predominating "passive" view to the "active" one.

Trend II: Investigations of students' conceptions of the nature and role of science and of students' view of their learning process

The "active" view of learning underlying research in our field highlights the importance of pre-conceptions. In the beginning of research there was a concentration on cognitive preconceptions at the content level (i. e. on conceptions such as on light, the electric circuit, combustion, photosynthesis, animals). In the meanwhile a broader perspective has been adopted. At first, science conceptions on a "meta-level", i. e. conceptions of the nature and role of science knowledge, are regarded. This mirrors the conviction that the way science is learned is considerably influenced by the students' view of what science is about. Secondly, the students' view of their learning process is taken into consideration. Research has shown that the view of learning influences learning considerably. A learner, for instance, who views learning as a process of filling in knowledge provided by the teacher or the textbook will learn accordingly, i. e. will take a "passive" learning habit. There is a further kind of "conception" taken care of in some studies now, namely students' interests and attitudes towards science and science instruction.

Another "enlargement" has to be mentioned. Whereas students' conceptions were investigated almost exclusively at the beginning of the research area some 10 to 15 years ago, teachers' conceptions are now being taken more and more into consideration (namely teachers' conceptions in a very broad sense, i. e. conceptions in specific content areas, conceptions of science and conceptions of teaching and learning).

The trend towards a broader investigation of conceptions appears to be the most important one in the research area. It is indeed a great challenge to research in our field. On the one hand, taking the whole complexity into consideration is unavoidable, but on the other hand, research could lose its' bearings in the labyrinth of this complexity.

Trend III: Theoretical approaches

Science educators in Germany starting research in the middle of the 1970s were quite aware that their work was part of a longstanding tradition, namely to start instruction with students' pre-instructional knowledge, interests and attitudes. There will certainly be similar traditions in other countries. In some way Ausubel's work draws on these traditions. His dictum "The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly" was and still is accepted as motto of their work by most researchers in our field.

It is interesting to look at Piaget's role in our research field because it is quite conflicting. On the one hand all researchers were, so to speak, resting upon Piaget's shoulders. Without Piaget's theoretical ideas, his investigations in so many thematic fields and his method of investigation research would have followed quite different paths.

On the other hand research on students' notions quite often marked off deliberately from Piaget. There was, for instance, in our research field a very general agreement that the contents of specific notions (such as notions of light, heat, burning) are of greater importance for learning processes in science than Piaget's general operations of thinking. Sometimes quite heavy battles were fought between "Piagetians" and "Alternative Frameworkers". But it appears that now most researchers take a more tolerant position, i. e. a position conceding that both general operations of thinking and conceptions (in the above mentioned broad sense) are important aspects in learning science. I think, by the way, that both "parties" have profited considerably from "fighting" one another.

It has been mentioned above that two "groups" started research in our field, namely science educators and cognitive psychologists. The latter group supplied the research field with their theories, e. g. network theories or information processing theories with the computer as paradigm for a learning system.

Without any doubt, philosophy of science as worked out by Hanson, T. S. Kuhn, Feyerabend and Lakatos influenced research considerably. In the case of these approaches there was the idea of theory laden observation and theory-guided development of learning.

The rapid growth of research on students' conceptions since the middle of the 1970s, therefore, is - at least partly - due to the fact that main lines of contemporary thinking were adapted and further developed. Not only the positions of philosophy of science were employed. Research was also implicitly influenced by contemporary science ideas which are known under headings such as self-organisation (in open systems). This is true because there are manifold relations of these lines of thinking with ideas of artificial intelligence which influenced research in our field via the already mentioned approaches of information processing theories. The rediscovery of constructivistic approaches fits very well into the trend we have outlined. These approaches have considerably influenced research on students' conceptions.

Since the end of the 1970s such constructivistic ideas have been employed in our research field. There are many different approaches "on the market" in the meantime, ranging from G. Kelly's theory of personal constructs to Vygotsky's approach of a social constructivism. To employ such approaches has been quite fruitful. But it cannot be overlooked that the word constructivism (or constructivistic) is sometimes used only as another label for what has been called above the "active" view of learning. Such a renaming appears to be of very limited use for the progress of research.

On the development of research in future

It is not too difficult to predict the development of the research field in the near future, i. e. in the next two to three years. Many research work which will be published within this period is running already or is at the planning stage, i. e. influenced by the above-mentioned trends. A long term prediction appears to be very difficult. I would like to mention one dangerous aspect for the research field: I think it could come to a sudden end because of resignation in much the same way as the curriculum movement ended in the middle of the 1970s. There are many attempts to overcome students' difficulties in learning science concepts and theories (see a brief overview above). The success of these attempts is not always convincing. Of course, there are some very encouraging findings. But so far the "great breakthrough" is missing and there are hints that it never will happen. It is necessary to draw the right conclusions from research findings so far available. It has to be discussed, for instance, whether science instruction has to be changed fundamentally (especially if it is true that many learning obstacles investigated lie in the principal difficulties of learning science). So far consequences for the aims of science instruction mostly have not been discussed on a fundamental level. Most approaches still try to avoid difficulties which hamper achievement of mainly the classical aims of science instruction, or try to overcome them.

If the present bibliography and the planned supplements could help the discussion on the "right" consequences for science instruction to be based on research knowledge available now, then it would have fulfilled one of its main aims.

BIBLIOGRAPHIE TEIL I

Dieser Teil der Bibliographie enthält etwa 1200 Artikel, die bis Dezember 1987 aufgenommen worden sind.

BIBLIOGRAPHY PART I

This part of the bibliography contains some 1200 articles entered before December 1987.

G1 ZUM UMFELD DES PROBLEMS "VORSTELLUNGEN DER SCHÜLER"

GENERAL CONSIDERATIONS CONCERNING RESEARCH IN THIS AREA

AEBLI, H.: Über die geistige Entwicklung des Kindes. Stuttgart: Klett, 1963
G1

AEBLI, H.: Piaget and Beyond. In: Interchange 1, 1970, 12-24
G1

AEBLI, H.: Piagets Deutung der kognitiven Entwicklung und ein Gegenmodell des geleiteten Strukturaufbaus. In: REULECKE, W. (Hrsg.): Strukturelles Lernen. Hamburg: Hoffmann und Campe, 1977, 146-161
G1

ALBERT, E.: Can Ausubel's Theorie of Meaningful Learning Become an Alternative to Piagetian Psychology ? In: Science Education 63 (1), 1979, 136-138
G1

ALLEN, R.D., DONOVAN, M.P., STATKIEWICZ, W.R.: Student Perceptions of Evidence and Interpretations. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 79-89
G1

ANDERSON, C.W.: Three perspectives on cognition and their implications for science teaching Paper presented at the Annual Meeting of the American Educational Research Association, Washington, D.C., April 1987
G1

ANDERSSON, B.R.: The experiential gestalt of causation: a common core to pupils preconceptions in science European Journal of Science Education 8, 1986, 155-171
G1;G6;P;M;E;T;O

ARCA, M., GUIDONI, P., MAZZOLI, P.: Structures of Understanding at the Root of Science Education. Part 1: Experience, Language and Knowledge. Part 2: Meanings of Formalization. European Journal of Science Education, 1983, 367-375, 1984, 311-319
G1

AUSUBEL, D.P.: Psychologie des Unterrichts. Weinheim, Basel: Beltz, 1974, Band 1
G1

BEILIN, H.: Piaget's Theorie: Refinement, Revision or Rejection ? In: KLUWE, R., SPADA, H. (Eds.): Developmental Models of Thinking. New York: Academic Press, in press
G1

BODNER, G.M.: Constructivism: A Theory of Knowledge Journal of Chemical Education Vol. 63, 10/1986, 873-878
G1

BRAINERD, C.J.: Lernforschung und Piagets Theorie. In: physica didactica 7, 1980, 2.Themenheft, 47-63
G1

BROUDY, H.S.: Tacit Knowing as a Rationale for Liberal Education. In: Teachers College Record 80 (30), 1979, 446-462
G1

BROWN, A.L.: Knowing When, Where, and How to Remember: A Problem of Metacognition. In: GLASER, R. (Ed.): Advances in Instructional Psychology. Hillsdale, N.Y.: Lawrence Erlbaum Associates, 1978, 77-165
G1

BROWN, G., DESFORGES, C.: Piagetian Psychology and Education: Time for Revision. In: British Journal of Educational Psychology 47, 1977, 7-17
G1

BRUHN, J.: Lernschwierigkeiten im Physikunterricht; Modelle und Konsequenzen; Versuch einer systematischen Übersicht. physica didactica 13 (1), 1986, 36-47
G1

CAREY, S.: Cognitive science and science education. American Psychologist 41, October 1986, 1123-1130
G1;G3

CASE, R.: A Developmentally Based Theory and Technology of Instruction. The Ontario Institute for Studies in Education, Toronto, Canada, 1978
G1

CASE, R.: Gearing the Demands of Instruction to the Developmental Capacities of the Learner. In: Review of Educational Research 45, 1975, 59-87
G1

CASE, R.: Structures and Strictures: Some Functional Limitations of the Course of Cognitive Growth. In: Cognitive Psychology 6, 1974, 544-573
G1

CHALOUHI, E.: Mecanismes cognitifs utilises' par les eleves et leurs professeurs dans la resolution d'un probleme d'electrocinetique. Role de la correction du probleme, en classe, par les professeurs. These, Laboratoire inter universitaire de Recherche sur l'Enseignement des Science Physiques et de la Technologie, Universite Paris VII, 1981
G1;G6;E;P

CHAMPAGNE, A.B., GUNSTONE, R. , KLOPFER, L.E.: A Perspective on the Differences Between Expert and Novice Performance in Solving Physics Problems. Paper given at the meeting of the Australian Sc.Educ.Research Assoc. Sydney, May 1982.(To be published in Research in Sc.Educ., 1982)
G1

CHAMPAGNE, A.B., GUNSTONE, R. , KLOPFER, L.E.: Instructional Consequences of Students'Knowledge about Physical Phenomena. In: WEST, PINES (Ed): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 61-90
G1;G7;P;M

CHAMPAGNE, A.B., GUNSTONE, R. , KLOPFER, L.E. Effecting Changes in Cognitive Structure among Physics Students. In: WEST, PINES (Ed): Cognitive Structure and Conceptual Change Orlando etc: Academic Press, 1985, 163-187
G1;G5;G6;G7;P;M

CHAMPAGNE, A.B., GUNSTONE, R. , WHITE, R.T.: Knowledge of Basic Principles of Dynamics. Working Paper. Faculty of Education, Monash University, Melbourne, 1979
G1;G6;M;P

CHAMPAGNE, A.B., KLOPFER, L.E., ANDERSON, J.: Factors Influencing the Learning of Classical Mechanics. In: American Journal of Physics 48, 1980, 1074-1079
G1;G6;G7;M;P

CHAMPAGNE, A.B., KLOPFER, L.E., DESENA, A.T., SQUIRES, D.A.: Structural Representations of Students' Knowledge Before and After Science Instruction. In: Journal of Research in Science Teaching 18 (2), 1981, 97-111
G1

CHAMPAGNE, A.B., KLOPFER, L.E., GUNSTONE, R. : A Model of Adolescents' Understanding of Physical Phenomena and its Application to Instruction. American Educational Research Association, 1981 Annual Meeting, Los Angeles, CA
G1

CHAMPAGNE, A.B., KLOPFER, L.E., GUNSTONE, R. : Cognitive Research and the Design of Science Instruction. In: Educational Psychologist 17 (1), 1982, 31-53
G1

CHAMPAGNE, A.B., KLOPFER, L.E., SOLOMON, C.A., CAHN, A.D.: Interactions of Students' Knowledge With Their Comprehension and Design of Science Experiments. Learning Research and Development Center, University of Pittsburgh, 1980
G1

CHAMPAGNE, A.B., KLOPFER, L.E.: Using the Consent: A Memo to Teachers. Learning Research and Development Center, University of Pittsburgh, 1980. (ERIC No.ED 188883)
G1;G6

CHAMPAGNE, A.B., KLOPFER, L.E.: Cognitive Science and Classroom Practice. University of Pittsburgh, Learning Research and Development Center. Paper prepared for presentation at the Conference on Student Achieve ment sponsored by the Coalition of Michigan Subject Matter Education Organizations, Lansing, Michigan, 22 October 1980
G1

CHAMPAGNE, A.B., KLOPFER, L.E.: Cognitive Science and Instructional Practice. Paper prepared for presentation at the Seventh International Conference on Improving University Teaching, Tsukuba, Japan, 16 July 1981
G1

CHAMPAGNE, A.B.: Cognitive Research and the Design of Science Instruction. In: Proceedings of the International workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 387-440
G1

CHI, M.T.H., FELTOVICH, P.J., GLASER, R.: Representation of Physics Knowledge by Experts and Novices. University of Pittsburgh, Learning Research and Development Center, Technical Report No.2
G1

CLAXTON, G.L.: Teaching and acquiring scientific knowledge. To appear in: Keen, Pope (Ed.): Kelly in the classroom. Montreal: Cybersystems, n.d.
G1

CLAXTON, G.L.: Book Reviews: The Alternative Conceivers Conceptions. Studies in Science Education 13, 1986, 123-130
G1

CLEMENT, J.: Some Types of Knowledge Used in Understanding Physics. Department of Physics and Astronomy, University of Massachusetts, April 1978
G1

CLEMENT, J. Analogy Generation in Scientific Problem Solving. Proceedings of the Third Annual Meeting of the Cognitive Science Society, 1981
G1;G7

CLINCHY, B., ROSENTHAL, E.: Analysis of Children's Errors. In: LESSER, G.S. (Ed.): Psychology and Educational Practice. Glenview (Illinois): Scott, Foresman and Company, 1971, 90-130
G1

CONFREY, J.: Implications for Teaching from the Research on Misconceptions. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 31-61
G1

COSGROVE, M., OSBORNE, R.J.: Lesson frameworks for changing children's ideas. Osborne, R., Freyberg, P.: Learning in science. The implications of children's science
G1;G7

DAWSON, C.J.: Pupils Difficulties: What Can the Teacher Do ? In: Education in Chemistry 15, 1978, 120-121, 123
G1

DE CARCER, I.A., GABEL, D.L., STAVER, J.R.: Implications of Piagetian Research for High School Science Teaching: A Review of the Literatur. In: Science Education 62 (4), 1978, 571-583
G1

DEKKERS, J., MALONE, J.: The Concept Map as an Aid to Introduktion in Science and Mathematics. Science and Mathematics Education Centre, Western Australia, Bentley, 1983
G1;G7

DI SESSA, A.A.: Phenomenology and the Evolution of Intuition. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey, London: Lawrence Erlbaum, 1983, 15-33
G1;G8;P;E;S

DI SESSA, A.A.: Knowledge in Pieces. Graduate School of Education, University of California, Berkeley, Sept. 24, 1985
G1;G7

DRIVER, R., BELL, B. Students' Thinking and the Learning of Science: a Constructivist View. The School Science Review 67, March 1986, 443-456
G1

DRIVER, R., EASLEY, J.A.: Autonomous Dynamical Thinking of Young Adolescent Physics Students. In: EASLEY, J.A. (Ed.): The Uses of Mathematics in Science Teaching. Final report on project UMIST, NSF contract GW-2262, Urbana, Illinois: 1969
G1

DRIVER, R., EASLEY, J.: Pupils and Paradigms: A Review of Literature Related to Concept Development in Adolescent Science Students. In: Studies in Science Education 5, 1978, 61-84
G1;G8

DRIVER, R., ERICKSON, G.: Theories-in-Action: Some Theoretical and Empirical Issues in the Study of Students' Conceptual Frameworks in Science. Studies in Science Education 10, 1983, 37-60
G1;G8

DRIVER, R., GUESNE, E., TIBERGHIEN, A.: Some Features of Children's Ideas and their Implications for Teaching. In: Driver, R., Guesne, E., Tiberghien, A.(ed.): Children's Ideas in Science, 1985, 193-201
G1;G7

DRIVER, R., GUESNE, E., TIBERGHIEN, A.: Children's Ideas in science Milton Keynes, Philadelphia: Open University Press, 1985
G1;G8;G7

DRIVER, R., GUESNE, E., TIBERGHIEN, A.: Children's Ideas and the learning of Science. In: Driver, R., Guesne, E., Tiberghien, A.(ed.): Children's Ideas in Science, 1985, 1-9
G1;G7

DRIVER, R.,OLDHAM, V.: A Constructivist Approach to Curriculum Development in Science. Paper prepared for the Symposium "Personal Construction of Meaning in Educational settings". BERA, Sheffield, 1985
G1

DRIVER, R.: The Pupil as Scientist. Paper presented to the GIREP conference, Rehovot, Israel, August 1979
G1

DRIVER, R.: Pupils' Alternative Frameworks in Science. In: European Journal of Science Education 3 (1), 1981, 93-101
G1;G8

DRIVER, R.: Cognitive Psychology and Pupils' Frameworks in Mechanics. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 171-198
G1;G8;P;S

DRIVER, R.: The approach of the children's learning in science project. Annual Meeting of the American Educational Research Association, San Francisco, 1986
G1;G7

DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981
G1
DUIT, R.: Research on Students' Frameworks – Report of a Closing Discussion led by A.C.Pessoa. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 310-311
G1
EASLEY, J. : Piaget and Education. Paper presented at Jean Piaget Society. Philadelphia, May 1977
G1
EASLEY, J. : The Interplay of Conflicting Schemes in Quantitative Science. (University of Illinois at Urbana-Champaign. Report No. 21, 1981). In: Proceedings of the International workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 453-490
G1
ERICKSON, G. : Student Frameworks and Classroom Instruction. In: Proceedings of the International Seminar – Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 480-500
G1;G7;B;P;T
ERICKSON, G. : Some Issues on Cognitive Structure and Conceptual Change in Science Education: one Perspective from North America. Paper presented at the AERA Meeting 1984 in New Orleans
G1
FENSHAM, P.J.: Prior Knowledge – A Source of Negative Factors for Subsequent Learning. In: TISHER, R.P. (Ed.): Research 1972. Proceedings of the third annual conference of the Australian Science Education Research Association. University of Queensland Printers, 1972, 50-57
G1
FISHER, K.M., LIPSON, J.I.: Information processing interpretation of errors in college science learning. Instructional Science 14, 1985, 49-74
G1
FISHER, K.M., LIPSON, J.I.: Twenty Questions about student errors. Journal of Research in Science Teaching 23, 9, 1986, 783-803
G1
FISHER, K.M.: Ten Rules of Thumb: Information Processing Interpretations of Error Research in Learning. In: Proceedings of the International Seminar – Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 150-162
G1
FLAVELL, J.H., WELLMAN, H.M.: Metamemory. In: KAIL, R.V., HAGEN, J.W. (Eds.): Perspectives on the Development of Memory and Cognition. Hillsdale, N.J.: Lawrence Erlbaum Assoc. 1977
G1
FLAVELL, J.H.: Metacognitive Aspects of Problem Solving. In: RESNICK, L.B. (Ed.): The Nature of Intelligence. Hillsdale, N.J.: Lawrence Erlbaum Assoc. 1976
G1
FLAVELL, J.H.: Cognitive Development. Englewood Cliffs, N.J.: Prentice Hall, 1977
G1
FREY, K., LANG, H. (Hrsg.): Kognitionspsychologie und naturwissenschaftlicher Unterricht. Bern, Stuttgart, Wien: Huber, 1973
G1
FREY, K., PFUNDT, H., LEHRKE, M., BAYRHUBER, H., JENELTEN-ALLKOFER, C.: Nutzung psychologischer Methoden und Erkenntnisse bei der Vorbereitung naturwissenschaftlicher Curricula. Kiel: IPN, polykop. 1982
G1;G8;G4;C

FREYBERG, P., OSBORNE, R.J. Assumptions about Teaching and Learning. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science, 1985, 82-90
G1;G7

FREYBERG, P.: Implications across the Curriculum. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science, 1985, 125-135
G1

GAULD, C.F.: Physics Teaching and Cognitive Functioning. A Neo-Piagetian Perspective. In: The Physics Teacher 17 (8), 1979, 512-518
G1

GIL, D., CARRASCOSA, J.: Science Learning as a Conceptual and Methodological Change. European Journal of Science Education 7, 1985, 231-236
G1

GIL, D., CARRASCOSA, J.: Science Learning as a Conceptual and Methodological Change. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985
G1

GILBERT, J.K., OSBORNE, R.J., FENSHAM, P.J.: Children's Science and its Consequences for Teaching. In: Science Education 66 (4), 1982, 623-633
G1;G8

GILBERT, J.K., SWIFT, D.J.: Towards a Lakatosian Analysis of the Piagetian and Alternative Conceptions Research Programs. Science Education 69, 1985, 681-696
G1

GILBERT, J.K., WATTS, M.: Concepts, Misconceptions and alternative Conceptions: changing perspectives in Science Education. Studies in Science Education 10, 1983, 61-98
G1;G4;P;E;EN;O;AT;T;C;B

GILBERT, J.K.: The Cognitive-Development Research Seminar, Science and Mathematics Education. (University of Leeds, 17-21, September 1979): A Personal Appreciation. In: Journal of Research in Science Teaching 2, 1980, 191-193
G1

GIORDAN, A.: Boire, manger, dormir... Des conceptions des apprenants a leurs utilisations didactiques. In: Giordan,A., Martinand, J.-L.(Hrsg.): Education scientifique et vie quotidienne, 1988, 411-419
G1

GIORDAN, A.: Bibliographie concernant les recherches sur les conceptions des apprenants en Biologie. Annales de didactique des sciences No 2, BIODIC LDES 1987
G1;G8

GLASERSFELD, E.V.: Learning as a constructive activity. In: Bergeron, J.C., Herscovics, N.(Ed.): Proceedings of Fifth Annual Meeting PME-NA, Montreal, Canada, 1983, 41-69
G1

GOFFMAN, E.: Rahmen-Analyse. Ein Versuch über die Organisation von Alltagserfahrungen. Frankfurt/Main: Suhrkamp, 1977
G1

GOWIN, D.B.: Misconceptions, Metaphors and Conceptual Change: Once More With Feeling. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 38-46
G1

GREENO, J.G., RILEY, M.S.: Analysis of Acquiring Strategic Knowledge in Problem Solving. A Proposal. University of Pittsburgh, April 1980
G1

GREENO, J.G.: The Structure of Memory and the Process of Solving Problems. In: SOLSO, R.L. (Ed.): Contemporary Issues in Cognitive Psychology: The Loyola Symposium. Washington: Winston and sons, 1973, 103-133
G1

GUIDONI, P.: Phenomenology of the Understanding and Misunderstanding of Physics. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 411-421
G1
GUIDONI, P.: On Natural Thinking. European Journal of Science Education 7, 1985, 133-140
G1
GUNSTONE, R. , CHAMPAGNE, A.B., KLOPFER, L.E.: Instruction for Understanding: A Case Study. In: The Australian Science Teachers Journal 27 (3), 1981, 27-32
G1;G7;P;M
GUNSTONE, R., NORTHFIELD, J. : Learners - Teachers - Researchers: Consistency in Implementing Conceptual Change. Paper presented at the meeting of the American Educational Research Association, San Francisco, April, 1986
G1;G7
GÖBEL, R.: Methodische Probleme der Erarbeitung und Festigung qualitativer Merkmale von Begriffen im Physikunterricht. Physik in der Schule 24, 1986, 274-281
G1;G4
HASHWEH, M.Z.: Toward an explanation of conceptual change. European Journal of Science Education, Vol. 8, No. 3, 1986, 229-249
G1
HAWKINS, D.: Critical Barriers to Science Learning. In: Outlook 29 (3), 1978
G1
HAYES, J.R., SIMON, H.A.: Understanding Written Problem Instructions. In: GREGG, L.W. (Ed.): Knowledge and Cognition. Potomac Maryland: Erlbaum, 1974, 167-200
G1
HEAD, J.O., SUTTON, C. : Language, Understanding and Commitment. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc.: Academic Press, 1985, 91-100
G1;G8
HEEGE, R.: Was bedeutet "aristotelisches Denken" bei Kindern ? In: physica didactica 8, 1981, 209-216
G1;G3
HEEGE, R.: Konvergente Beschreibungen von Bewegungsphänomenen bei Aristoteles und bei Kindern. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1981. Gießen: I.Physikalisches Institut, 1981, 93-99
G1;G3
HELM, H., NOVAK, J.D. (EDS.): Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983
G1;G8
HELM, H.: "Do Students Understand the Nature and Role of Scientific Concepts?" In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 41-48
G1
HELM, H.: Misconceptions' Research: A Problem oriented Perspective. Paper prepared for a symposium: Perspectives on Cognitive Structure and Conceptual Change at the 1985 AERA Annual Meeting, Chicago, 1985
G1;G8
HENCKELL, H.: Die Entwicklung physikalischer Begriffe im Sachunterricht. In: HÄRTEL, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1979, 58-60
G1
HERRON, J.D.: Commentary on "Piagetian Cognitive Development and Achievement in Science". In: Journal of Research in Science Teaching 13 (4), 1976, 358-360
G1

HERRON, J.D.: Role of Learning and Development: Critique of Novak's Comparison of Ausubel and Piaget. In: Science Education 62 (4), 1978, 593-605
G1

HEWSON, M.G.: The Role of Intellectual Environment in the Origin of Conceptions: an Exploratory Study. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 153-161
G1;G4;G8;P;T;

HEWSON, P.W.: A Conceptual Change Approach to Learning Science. In: European Journal of Science Education 3 (4), 1981, 383-396
G1

HEWSON, P.W. Epistemological Commitments in the Learning of Science: Examples from Dynamics. European Journal of Science Education 7, 1985, 163-172
G1;P;M

HEWSON, M.G.: The Acquisition of Scientific Knowledge: Analysis and Representation of Student Conceptions Concerning Density. Science Education 70(2), 1986, 159-170
G1;G8;P;M

HILGARD, E.R., BOWER, G.H.: Theorien des Lernens I. Stuttgart: Klett, 1970
G1

HILGARD, E.R., BOWER, G.H.: Theorien des Lernens II. Stuttgart: Klett, 1971
G1

HILLS, G.: Misconceptions Misconceived? Using Conceptual Change to Understand Some of the Problems Pupils Have in Learning Science. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 245-256
G1

HUBER, G.L.: Begriffsbildung im Unterricht. München: Ehrenwirth, 1979
G1

HÄUSLING, A.: Was heißt eigentlich Sachlernen? GEP 14, Nr. 7, 1986
G1;G4;G7

HÄUSSLER, P.: Denken und Lernen Jugendlicher beim Erkennen funktionaler Beziehungen. Ein Beitrag zur Unterrichtsforschung auf der Grundlage formalisierter Theorien des Denkens und Lernens. Bern, Stuttgart, Wien: Huber, 1981
G1

INHELDER, B., PIAGET, J.: The Growth of Logical Thinking from Childhood to Adolescence. Basic Books, New York, 1958
G1

INHELDER, B., SINCLAIR, H., BOVET, M.: Learning and the Development of Cognition. New York: Harvard University Press, 1974 London: Routledge & Kegan Paul Ltd. 1974
G1

JENKINS, E.W.: Piaget and School Chemistry - A Critique. In: Education in Chemistry 15, 1978, 85-86
G1

JOHANSSON, B., MARTON, F., SVENSSON, L.: An Approach to Describing Learning as Change Between Qualitative Different Conceptions. In: WEST, PINES (ED.): Cognitive Structure and Conceptual Change. Orlando etc.: Academic Press, 1985, 233-258
G1

JUNG, C.G., PAULI, W.: Naturerklärung und Psyche. Zürich: 1952
G1

JUNG, W. (Hrsg.): Piaget und Physikdidaktik. In: physica didactica 7, 1980 (Sonderheft)
G1

JUNG, W., PFUNDT, H., RHÖNECK, C. v. (Eds.): Problems Concerning Students' Representations of Physics and Chemistry Knowledge. Ludwigsburg: 1981
G1

JUNG, W., REUL, H., SCHWEDES, H.: Untersuchungen zur Einführung in die Mechanik in den Klassen 3-6. Frankfurt/Main: Diesterweg, 1977
G1;G6;G7;P;E

JUNG, W., SCHWEDES, H.: Lernschwierigkeiten im Physikunterricht. In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1975, 82-90
G1;G6;P;E

JUNG, W., WIESNER, H., ENGELHARDT, P.: Vorstellungen von Schülern über Begriffe der Newtonschen Mechanik. Bad Salzdetfurth: didaktischer Dienst Franzbecker, 1981
G1;G6;P;E

JUNG, W.: Was heißt Physik lernen ? Didaktik der Physik zwischen Physik und Wissenschaftstheorie. In: EWERS, M. (Hrsg.): Naturwissenschaftliche Didaktik zwischen Kritik und Konstruktion. Weinheim: Beltz, 1975, 123-166
G1

JUNG, W.: Zum Problem der "Schülervorstellungen". In: physica didactica 5 (3), 1978, 125-146, physica didactica 6 (4), 1979, 231-248
G1;G5;G6;P;E

JUNG, W.: Schülervorstellungen in Mechanik. In: HÄRTEL, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1979, 74-76
G1;G6;P;E

JUNG, W.: Aufsätze zur Didaktik der Physik und Wissenschaftstheorie. Frankfurt/Main: Diesterweg, 1979
G1

JUNG, W.: Vorstellungen der Schüler zu physikalischen Begriffen. Langfassung eines Vortrages am 3.12.1980 an der FU-Berlin
G1

JUNG, W.: Zum Anfangsunterricht in Optik: Untersuchungen und didaktische Konsequenzen. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1981. Gießen: 1.Physikalisches Institut, 1981, 433-439
G1;G4;O;P

JUNG, W.: Introduction to the Conference - Toward a Synthesis of Research Efforts. In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 1-11
G1

JUNG, W.: Zur Bedeutung von Schülervorstellungen für den Unterricht. In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 1-23
G1

JUNG, W.: Über die Schwierigkeiten, Physik zu lernen. In: physica didactica 9, 1982, 156-167
G1

JUNG, W.: Elementary Electricity: An Epistemological Look at Some Empirical Results. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Eds.): Understanding Electricity - Proceedings of a Workshop. Pädagogische Hochschule Ludwigsburg, 1984
G1;G7;P;E

JUNG, W.: Schülervorstellungen im Physikunterricht - ein didaktisches Problem. physica didactica 12, 1985, Heft 4, 11-23
G1

JUNG, W.: Uses of Cognitive Science to Science Education. Paper presented to the ATEE Symposium on the Implications of Cognitive Science for the Education of Science Teachers, Kiel, 31.08.1985
G1

JUNG, W.: Cognitive science and history of science. Paper presented at the Munich Conference 04.06.1986
G1;G8

JUNG, W.: Alltagsvorstellungen und das Lernen von Physik und Chemie. In: Duit, R., Jung, W., Rhöneck, Ch.v.(Hrsg.): Alltagsvorstellungen. Naturwissenschaften im Unterricht Physik/Chemie 34, April 1986, 2-6
G1;G7

JUNG, W.: Verständnisse und Mißverständnisse. physica didactica 14(1/2), 1987, 23-30
G1;G5;G6;P;O

KEATING, D.P.: Adolescent Thinking. In: ADELSON, J.P. (Ed.): Handbook of Adolescence. New York: Wiley, in press
G1

KEMPA, R.F.: Cognitive Psychology in Science Education - Issues for the Future. Paper represented at the "Cognitive Development Research Seminar, Science and Mathematics Education", Leeds: September 1979
G1

KLIX, F.: Information und Verhalten. Bern: Huber, 1971
G1

KLOPFER, L.E: Intelligent Tutoring Systems in Science Education. The Coming Generation of Computer-Based Instructional Programs. Journal of Computers in Mathematics and Science Teaching, Vol. 5, No. 4, 1986
G1;G7

KUBLI, F.: Die Bedeutung der Psychologie Piagets für den Physikunterricht. In: Der mathematische und naturwissenschaftliche Unterricht 27, 1974, 44-46
G1

KUBLI, F.: Piaget's Cognitive Psychology and its Consequences for the Teaching of Science. In: European Journal of Science Education 1 (1), 1979, 5-20
G1

KUBLI, F.: Was kann Piagets Erkenntnispsychologie für den Physikunterricht leisten ? Polyskript, 1980
G1

KUBLI, F.: Piaget und Naturwissenschaftsdidaktik. Köln: Aulis, 1981
G1

KUBLI, F.: Piaget's Clinical Experiments and Some Conclusions for Science Teaching. In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 92-106
G1;G6

KUBLI, F.: Erkenntnis und Didaktik - Piaget und die Schule. München: Reinhardt Verlag, 1983
G1

KÜNZLI, R.: Von sinnlichen Vorstellungen zu deutlichen Begriffen. Vortrag IPN-Seminar, Kiel, 26. Sept. 1985
G1

LAMB, C.E.: "Do They Hear What I Say? - And Do They Understand What I Mean?" In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 93-99
G1

LARKIN, J., McDERMOTT, J., SIMON, D.P., SIMON, H.A.: Models of Competence in Solving Physics Problems., Department of Psychology, Carnegy Mellon University, 1979
G1

LARKIN, J. , McDERMOTT, J., SIMON, D.P., SIMON, H.A.: Expert and Novice Performance in Solving Physics Problems. Department of Psychology, Carnegy Mellon University, 1979, Working Paper No. 410
G1

LARKIN, J. : Problem Solving in Physics. University of California, Berkely, 1977
G1
LARKIN, J. : Skill Acquisition for Solving Physics Problems. Carnegy Mellon Univesity, 1979
G1
LARKIN, J. : Cognition of learning physics. American Journal of Physics 49, 1981, 534-541
G1;G8;P;E
LARKIN, J. : The Role of Problem Representation in Physics. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey London: Lawrence Erlbaum, 1983, 75-98
G1;G8;P;E
LEHNER, H.: Erkenntnis durch Irrtum als Lehrmethode. Bochum: Kamp, 1979
G1
LIN, H.: A "Cultural" Look at Physics Students and Physics Classrooms - An Example of Anthropological Work in Science Education. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 194-213
G1;G2
LINN, M.C., PULOS, S., GANS, A.: Correlates of Formal Reasoning: Content and Problem Effects. In: Journal of Research in Science Teaching 18 (5), 1981, 435-447
G1
LINN, M.C.: Theoretical and Practical Significance of Formal Thought: Some Considerations. Paper presented at the Society for Research in Child Development Meeting, San Francisco, California: March 1979
G1;G6
LINN, M.C.: When Do Adolescents Reason ? In: European Journal of Science Education 2 (4), 1980, 429-440
G1;G6
LINN, M.C.: Theoretical and Practical Significance of Formal Reasoning. In: Journal of Research in Science Teaching 19 (9), 1982, 727-742
G1
LOCHHEAD, J.: Beyond Emile - Misconceptions for Education in the twenty-first century. Paper presented at the AERA Meeting, Montreal, 1983
G1;G7
LOTT, G.W., SMITH, E.L.: Teaching For Conceptual Change: Some Ways of Going Wrong. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 57-66
G1
LOVELL, K.: Intellectual Growth and Understanding Science. In: Studies in Science Education 1, 1974, 1-19
G1
LOVELL, K.: The Relevance of Cognitive Psychology. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 1-20
G1
LUNZER, E.A.: On Children's Thinking. Publicated for the NFER in England and Wales, 1971
G1
LYBECK, L.: Forschungs- und Entwicklungsarbeit (FuE) aus einer aktuellen fachmethodischen Forschungsperspektive in Schweden gesehen. Institute of Education, University of Göteborg, 1979
G1

LYBECK, L.: Research into Science and Mathematics Education at Göteborg Department of Education and Educational Research. Gothenburg University. Report no. 1986: 03, 1986
G1;G6;P;M

LYTHOTT, J.: "Aristotelian" Was Given as the Answer, But What Was the Question. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 257-266
G1;G3

LÖFFLER, G., KÜHNLEIN, W.: Weg in die Naturwissenschaften - ein bruchloser Weg? physica didactica 12, 1985, Heft 4, 39-60
G1

MAHADEVA, M.N.: Misconceptions and Myths Masquerading as Biological Facts. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 266-271
G1

MAICHLE, U.: Beiträge der kognitiven Psychologie zur Analyse von Vorstellungen. In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 24-63
G1

MAICHLE, U.: Wissen, Verstehen und Problemlösen im Bereich der Physik Frankfurt am Main: Peter Lang, 1985
G1;G6;P;E

MAICHLE, U.: Wissen und Verstehen im Physikunterricht: Diagnose auf kognitionspsychologischer Grundlage In: Bleichroth, W.(Hrsg.): Aufsätze zur Didaktik der Physik. physica didactica 13, Sonderheft, 1986, 53-65
G1;G5

MALONY, D.P.: Cognitive Physics Educational Research - a Bibliography. Physics Department. Creighton University. Omaha, 1984
G1;G6;G7;P

MARTON, F.: Phenomenography - describing conceptions of the world around us. Instructional Science 10, 1981, 177-200,
G1;G5

MAYER, M.: La technologie employee dans la vie quotidienne. Influence-t-elle les conceptions spontanees des etudiants? In: Giordan, A., Martinand, J.-L.(Hrsg.): Education scientifique et vie quotidienne, 1988, 451-458
G1;G6

MAYER, R.E.: Denken und Problemlösen. Eine Einführung in menschliches Denken und Lernen. Berlin, Heidelberg, New York: Springer, 1979
G1

McCLELLAND, J.A.G.: Alternative Model for the Development of Frameworks of Concepts and Implications for Instruction in Science. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 96-99
G1

McCLELLAND, J.A.G.: Alternative Frameworks: Interpretation of Evidence. In: European Journal of Science Education 6 (1), 1984, 1-6
G1

MEHL, M.C., VOLMINK, J.D.: Influence of Cognitive Instruction on Misconceptions in Physics and Mathematics. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 226-233
G1

MEHLER, J., BEVER, T.G.: Cognitive Capacity of Very Young Children. In: Science 158, 1967, 141-152
G1

MILLER, A.G.: The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information. In: Psychological Review 63, 1956, 81-97
G1

MOTHES, R.: Wie werden Naturerscheinungen vom Kinde selbst gedeutet ? In: Zeitschrift für Naturlehre und Naturkunde 4, 1956, 64-67
G1;G6

NACHTIGALL, D.: Physikunterricht und die Entwicklung von Denkstrukturen. In: Naturwissenschaften im Unterricht - Physik/Chemie 27, 1979, 65-74
G1

NACHTIGALL, D.: Die Rolle von Präkonzepten beim Lehren und Lernen von Physik. In: Bleichroth, W.(Hrsg.): Aufsätze zur Didaktik der Physik. physica didactica 13, Sonderheft, 1986, 97-101
G1

NIEDDERER, H.: Probleme der Lebenswelt/Vorverständnis der Schüler und Wissenschafts theorie der Physik als Determinante für den Physikunterricht. In: FISCHLER, H. (Hrsg.): Lehren und Lernen im Physikunterricht. Köln: Aulis, 1982, S.105-132
G1

NIEGEMANN, H.M.: Lehren und Lernen von Begriffen im Unterricht. Dissertation. Saarbrücken, 1979
G1

NORMAN, D.A., RUMELHART, D.E. (Hrsg.): Strukturen des Wissens. Stuttgart: Klett-Cotta, 1978
G1

NORTHFIELD, J., GUNSTONE, R.: Research on alternative frameworks: Implications for science teacher education. Research in Science Education 13, 1983, 185-191
G1

NORTHFIELD, J., GUNSTONE, R.: Understanding learning at the classroom level. Research in Science Education 16, 1986, 18-27
G1;G7

NOVAK, J.D., SYMINGTON, D.: Concept Mapping for Curriculum Development. V.I.E.R. Bulletine 48, June 1982, 3-11
G1;G7

NOVAK, J.D.: Epicycles and the Homocentric Earth: Or What is Wrong With Stages of Cognitive Development ? In: Science Education 61, 1977, 393-395
G1

NOVAK, J.D.: A Theorie of Education. Ithaca, N.Y.: Cornell U.P., 1977
G1

NOVAK, J.D.: An Alternative to Piagetian Psychology for Science and Mathematics Education. In: Science Education 61, 1977, 453-477
G1

NOVAK, J.D.: An Alternative to Piagetian Psychology for Science and Mathematics Education. In: Studies in Science Education 5, 1978, 1-30
G1

NOVAK, J.D.: Editorial Comment on "Implications of Piagetian Research for High School Science Teaching: A Review of the Literatur". In: Science Education 62 (4), 1978, 591-592
G1

NOVAK, J.D.: Response to "Can Ausubel's Theorie of Meaningful Learning Become an Alternative to Piagetian Psychology?". In: Science Education 63 (2), 1979, 271-273
G1

NOVAK, J.D.: Methodological Issues in Investigating Learning. Paper represented at the "Cognitive Development Research Seminar, Science and Mathematics Education", Leeds: September 1979
G1

NOVAK, J.D.: Psychological and Epistemological Alternatives to Piagetian Developmental Psychology with support from Empirical Studies in Science Education. In: MOGDIL, S., MOGDIL, C.(Ed.): Consensus and Controversy. London: Holt, Rinehart, Winston 1982, 331-349
G1
NOVAK, J.D.: Can Metalearning and Metaknowledge Strategies to Help Students Learn How to Learn Serve as a Basis For Overcoming Misconceptions? In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 100-111
G1
NOVAK, J.D.: Metalearning and Metaknowledge Strategies to help Students learn how to learn. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 189-209
G1;G6
NUSSBAUM, J.: Towards the Diagnosis by Science Teachers of Pupils' Misconceptions: An Exercise With Student Teachers. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 260-272
G1
NUSSBAUM, J.: Towards the Diagnosis by Science Teachers of Pupils' Misconceptions: An Exercise With Student Teachers. In: Journal of Research in Science Teaching 3, 1981, 159-169
G1
OAKES., M.E.: Children's explanations of natural phenomena. Teachers college, Columbia University, Contributions to education, No. 926, New York 1947
G1;G6
OERTER, R.: Psychologie des Denkens. Donauwörth: Auer, 1971
G1
OGBORN, J.: Understanding Students' Understanding. European Journal of Science Education 7, 1985, 141-150
G1;G6;P;M
OLSTAD, R.G., HAURY, D.L.: A Summary of Research in Science Education - 1982, "Conceptual Understanding". In: Science Education 68, 1984, 219-222, 315-363
G1;G6
OSBORNE, R.J., BELL, B.: Science Teaching and Children's Views of the World. In: European Journal of Science Education 5 (1), 1983, 1-14
G1
OSBORNE, R.J., FREYBERG, P.: Learning in Science. The implications of children's science. Auckland: Heinemann 1985
G1
OSBORNE, R.J., FREYBERG, P.: Children's science. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science, 1985, 1-14
G1;G5
OSBORNE, R.J., FREYBERG, P.: Roles for the Science Teacher. In: Osborne, R., Freyberg, P.: Learning in Science. The implications of children's science, 1985, 91-99
G1;G7
OSBORNE, R.J., TASKER, R.: Introducing Children's Ideas to Teachers. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science, 1985, 136-148
G1;G7
OSBORNE, R.J., WITTROCK, M. : Learning Science: A Generative Process. In: Science Education 67 (4), 1983, 489-508
G1

OSBORNE, R.J., WITTROCK, M.: The Generative Learning Model and its Implications for Science Education. Studies in Science Education 12, 1985, 59-87
G1

OSBORNE, R.J.: Some Aspects of the Student's View of the World. In: Research in Science Education 10, 1980, 11-18
G1

PAOLONI, L.: Classical Mechanics and Quantum Mechanics: An Elementary Approach to the Comparison of the Two Viewpoints. In: European Journal of Science Education 4 (3), 1982, 241-251
G1

PASCUAL-LEONE, J., SMITH, J.: The Encoding and Decoding of Symbols by Children: A New Experimental Paradigm and a Neo-Piagetian Model. In: Journal of experimental child psychology. New York, London, 8, 1969, 328-355
G1

PIAGET, J.: Psychologische Betrachtungen über den Unterricht der Naturwissenschaft an der Grundschule. In: Pädagogischer Wegweiser III, Sonderheft, 1960
G1

PASCUAL-LEONE, J.: A Mathematical Model for the Transition Rule in Piaget's Developmental Stages. In: Acta Psychologica 32, 1970, 301-345
G1

PIAGET, J.: The Childs Conception of the World. London: Routledge & Kegan Paul, 1971
G1

PIAGET, J., INHELDER, B.: Die Psychologie des Kindes. Olten, Freiburg/Brsg.: Walter, 1972
G1

PIAGET, J.: Intellectual Evolution from Adolescence to Adulthood. In: Human Development 15, 1972, 1-12
G1

PIAGET, J.: Die Entwicklung des Erkennens II. Das physikalische Denken. Stuttgart: Klett, 1973
G1;G6;P

PIAGET, J.: Understanding Causality. New York: W.W. Norton & Co. Inc. 1974
G1

PINES, A.L., WEST, L.H.T.: A Framework for Conceptual Change With Special Reference to Misconceptions. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 47-52
G1

PINES, A.L., WEST, L.H.T.: Conceptual understanding and science learning: An interpretation of research within a sources of knowledge framework. Science Education 70 (5), 1986, 583-604
G1

PINES, A.L.: Towards a Taxonomy of conceptual Relations and the Implications for the Evaluation of Cognitive Structures. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 101-116
G1;G4

POPE, M., GILBERT,J.K.:Personal Experience and the Construction of Knowledge in Science. In: Science Education 67 (2), 1983, 193-203
G1

POPE, M.: Constructivist Goggles: Implications for Process in Teaching and Learning. Paper presented at BERA Conference, Sheffield, 1985
G1

POSNER, G. , STRIKE, K.A., HEWSON, P.W., GERTZOG, W.A.: Accommodation of a Scientific Conception: Toward a Theory of Conceptual Change. Science Education 66(2), 1982, 211-227
G1

POSNER, G. : A Model of Conceptual Change: Present Status and Prospect. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 53-66
G1

PREECE, P.F.W.: A Note on the Comparison of Cognitive and Subject-Matter Structure. In: Journal of Research in Science Teaching 3, 1976, 353
G1

PREECE, P.F.W.: Exploration of Semantic Space. Review of Research on the Organization of Scientific Concepts in Semantic Memory. In: Science Education 62, 1978, 547-562
G1;G5

PREECE, P.F.W.: Intuitive Science: Learned or Triggered? In: European Journal of Science Education 6 (1), 1984, 7-10
G1;G3

PULOS, S. , LINN, M.C.: Formal Operations and Group Differences: Fact or Artifact? In: Proceedings of the Eighth Annual UAP-USC Conference on Piaget and the Helping Professions, 1977
G1

RAGHUBIR, K.P.: The Effects of Prior Knowledge of Learning Outcomes on Student Achievement and Retention in Science Instruction. In: Journal of Research in Science Teaching 16 (4), 1979, 301-304
G1

REDEKER, B.: Zur Bedeutung des Vorverständnisses für das Lernen von Physik. In: physica didactica 8, 1981, 107-120
G1

REDEKER, B.: Zum Anfang des Physiklernens. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1983. Gießen: I.Physikalisches Institut, 1983, 356-367
G1;G2

REDEKER, B.: Bemerkungen zur Einleitung zu den Referaten von G. Löffler und W. Köhnlein in "physica didactica", Heft 4, 1985 "physica didactica 13, Heft 2/3, 1986, 34
G1

REDEKER, B.: Die Vorstruktur des Verstehens und das Lernen von Physik. Vortrag, gehalten auf dem Symposium "Lebenswelt und Lernen von Physik" Bad Honnef, 1985
G1

REDEKER, B.: Zur Lehrbarkeit der Physik. Kuhn, W.(Hrsg): Didaktik der Physik. Vorträge der Physikertagung 1986 München. DPG Fachausschuß Didaktik der Physik, 1986, 509-527
G1

REED, J.L.: Kinder erklären Naturphänomene. In: HALBFAS, H., MAURER, M., POPP, W. (Hrsg.): Neuorientierung des Primarbereichs, Band 4, In Modellen denken. Stuttgart: Klett, 1976, 32-65
G1

REIF, F.: Cognitive Mechanisms Facilitating Human Problem Solving in a Realistic Domain: The Example of Physics. Physics Department and Group in Science and Mathematics Education. University of California, Berkley, 1979
G1

REIF, F.: Knowledge Structure and Problem Solving in Physics. In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 12-78
G1

REIF, F.: Understanding and Teaching Problem Solving in Physics. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983
G1

REIF, F.: Acquiring an Effective Understanding of Scientific Concepts. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 133-151
G1

REIF, F.: Acquiring an Effective Understanding of Scientific Concepts. Physics Department and Group in Science and Mathematics Education. University of California, Berkeley, California 94720 n.d.
G1

RENNER, J.W.: Significant Physics Content and Intellectual Development. In: Physics Education 11, 1976, 458
G1

RESNICK, L.B.: The Role of Invention in the Development of Mathematical Competence. In: KLUWE, R., SPADA, H. (Eds.): Developmental Models of Thinking. New York: Academic Press, in press
G1

RESNICK, L.B.: Mathematics and Science Learning: A New Conception. In: Science 220, April 1983
G1

RILEY, M.S.: Representations in Earley Learning: The Acquisition of Problem-Solving Strategies in Basic Electricity/Electronics. In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 107-173
G1

ROSS, K.A.: Concept Profiles and the Cultural Context. In: European Journal of Science Education 4 (3), 1982, 311-323
G1

ROST, J.: Network Theories of Semantic Memory and their Implications for Teaching Physics. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 185-211
G1

ROWELL, J.A., DAWSON, C.J.: Equilibration, conflict and instruction: A new class-oriented perspective. European Journal of Science Education 7, 1985, 331-334
G1;G7

RUSSEL, D.H.: Children's Thinking. Blaisdell, Waltham, Mass., 1956
G1

SAVAGE, M.M.: The Inter-Relationship of Pupil Intelligence, Level of Performance at Piaget's Combinatorial and Correlations Tasks and Conceptual Attainment in O level Chemistry. M. Ed . thesis. Queen's University of Belfast, 1975
G1

SCHAEFER, G.: Concept Formation in School Between Scientific and Community. Paper presented at the "Cognitive Development Research Seminar, Science and Mathematics Education", Leeds, September 1979
G1

SCHAEFER, G.: Inclusive Thinking with Inclusive Concepts. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 382-396
G1

SCHAEFER, G.: Naturwissenschaftlicher Unterricht auf dem Wege vom exklusiven zum inklusiven Denken. MNU 37, 1984, 324-336
G1

SCHECKER, H.: Das Schülerverständnis zur Mechanik. Dissertation, Universität Bremen, 1985
G1;G4;P;M

SCHÄFER, K.: Von der Alltagserfahrung zur Newtonschen Mechanik. In: KUHN, W. (Hrsg): Didaktik der Physik. Vorträge der Physikertagung 1984. Gießen: DPG-Fachausschuß Didaktik der Physik, 1984, 166-172
G1;G5;G6;P

SCHÄFER, K.: Zur Bedeutung von Schülervorstellungen für den Physikunterricht. Schriften des Deutschen Vereins zur Förderung des mathematischen und naturwissenschaftlichen Unterrichts, Heft 33, 1986, 7-17
G1;G4;P;M

SCHÖN, L., PEDRA, R.D.: Beschreibt Physik eigentlich das, was wir wahrnehmen? Wiebel, K.H.(Hrsg.): Zur Didaktik der Physik u. Chemie; Vorträge auf der Tagung f. Didaktik der Physik/Chemie, Oldenburg, 1986, 232-234
G1

SHAYER, M.: The Match of Science Curriculum to the Learner in the Middle and Secondary School. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 62-79
G1

SHUELL, T.J.: Knowledge Representation, Cognitive Structure and School Learning: a Historical Perspective. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change Orlando etc: Academic Press, 1985, 117-130
G1;G5

SIEGEL, L.S., BRAINERD, C.J. (Eds.): Alternatives to Piaget. Critical Essays on the Theory. Academic Press, New York et al. 1978
G1

SIMON, H.A., HAYES, J.R.: The Understanding Process: Problem Isomorphs. In: Cognitive Psychology 8, 1976, 165-190
G1

SMEDSLUND, J.: The Acquisition of Conservation of Substance and Weight in Children. In: Scandinavian Journal of Psychology 2, 1961, 11-20, 71-84, 85-87, 153-155, 156-160, 203-210
G1

SOLOMON, J.: Thinking in Two Worlds of Knowledge. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 127-132
G1

SOLOMON, J.: Prompts, Cues and Discrimination: the Utilization of two separate Knowledge Systems. European Journal of Science Education 6, 1984, 277-284
G1;G6;P;EN

SPADA, H., KLUWE, R.: Two Models of Intellectual Development and Their Reference to the Theory of Piaget. In: KLUWE, R., SPADA, H. (Eds.): Developmental Models of Thinking. New York: Academic Press, in press
G1

SPADA, H., REIMANN, P., HÄUSLER, B.: Hypothesen im Prozeß des Wissenserwerbs: Eine entwicklungspsychologische Analyse. Forschungsberichte des Psychologischen Instituts der Universität Freiburg, Nr.1, März 1983
G1

SPADA, H.: Modelle des Denkens und Lernens. Bern, Stuttgart, Wien: Huber, 1976
G1

SPRECKELSEN, K. (ED.): Schülervorstellungen im Sachunterricht der Grundschule - Vorträge des 2. Arbeitstreffens zum fächerübergreifenden naturwissenschaftlich-technischen Sachunterricht. Gesamthochschule Kassel, 1986
G1

SPRECKELSEN, K.: Analyse und didaktische Aufbereitung von Begriffen. In: FREY, K. u.a. (Hrsg.): Curriculumhandbuch, Bd.2 München: Piper, 1975, 76-84
G1
SPRECKELSEN, K.: Schülervorstellungen im Grundschulalter. In: Bleichroth, W.(Hrsg): Aufsätze zur Didaktik der Physik. physica didactica 13, Sonderheft, 1986, 103-106
G1;G6;P
STENHOUSE, D.: Conceptual change in science education: Paradigms and Language-Games. Science Education 70(4), 1986, 413-425
G1;G4
STEWART, J.: Cognitive Science and Science Education. European Journal of Science Education 7, 1985, 1-17
G1
STRAUSS, S.: Educational Implications of U-Shaped Behavioral Growth. A Position Paper for the Ford Foundation, 1977
G1
STRIKE, K.A., POSNER, G. .: Conceptual Change and Science Teaching. In: European Journal of Science Education 4 (3), 1982, 231-240
G1
STRIKE, K.A., POSNER, G. : A Conceptual Change View of Learning and Understanding. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc.: Academic Press, 1985, 211-231
G1
STRIKE, K.A.: Misconceptions and Conceptual Change: Philosophical Reflections on the Research Program. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 67-78
G1
STRNAD, J.: Qualitative und quantitative Gesichtspunkte im Physikunterricht. physica didactica 13, Heft 2/3, 1986, 45-60
G1
STÜCKRATH, F.: Die geistige Entwicklung des Kindes in der technischen Wirklichkeit. In: Westermanns Pädagogische Beiträge 8, 1956, 213-218
G1
SUAREZ, A.: Formales Denken und Funktionsbegriff bei Jugendlichen. Bern: Huber, 1977
G1
SUTTON, C., WEST, L.: Investigating Children's Existing Ideas About Science. A research seminar, April 1982
G1;G6
SZEKELY, L.: Denkverlauf, Einsamkeit und Angst. Experimentelle und psychoanalytische Untersuchungen über das kreative Denken. Bern: Huber, 1976
G1
TAMIR, P.: Some Comments on "Methodological Issues in Investigating Learning" by Joseph D. Novak. Paper presented at the "Cognitive Development Research seminar, Science and Mathematics Education", Leeds, September 1979
G1
TASKER, R., FREYBERG, P.: Facing the mismatches in the classroom. In: Osborne, R.J., Freyberg, P.: Learning in science. The implications of children's science, 1985, 66-80
G1;G7
VERGNAUD, G., HALBWACHS, F., ROUCHIER, A.: Structure de la matiere enseignee histoire des science et developement conceptuel chez l'eleve. In: Revue Francaise de Pedagogie 45, 1978, 7-15
G1;G3

VESTER, F.: Denken, Lernen, Vergessen. Stuttgart: Deutsche Verlagsanstalt, 1975
G1

VICENTINI-MISSONI, M.: Common Sense Knowledge and Scientific Knowledge. Paper, presented in Halifax: "World Trends in Science Education", 1979
G1

VIENNOT, L.: Natural Tendencies in Analysing Students' Reasoning Two Instances in Mechanics. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 239-244
G1;G6;P;M

VIENNOT, L.: Analysing Students' Reasoning in Science: A Pragmatic View of Theoretical Problems. European Journal of Science Education 7, 1985, 151-162
G1;G6;P;M

WAGENSCHEIN, M.: Was bleibt ? (Verfolgt am Beispiel der Physik). In: FLÜGGE, J. (Hrsg.): Zur Pathologie des Unterrichts. Bad Heilbrunn: Klinkhardt, 1970, 74-91
G1

WASON, P.C., JOHNSON-LAIRD, P.N.: Psychology of Reasoning. B.T. Batsford Ltd., 1972
G1

WATERMAN, M.A.: Alternative Conceptions of the Tentative Nature of Scientific Knowledge. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 282-291
G1

WATTS, D.M., POPE, M. : Modulation and Fragmentation: Some cases from science education. Paper presented at the 6th International Congress on Personal Construct Psychology, Cambridge, August 1985
G1

WEINERT, F.E.: Entwicklungsgemäßer Unterricht. In: Unterrichtswissenschaft 5, 1977, 1-13
G1

WEST, L.H.T., FENSHAM, P.J., GARRARD, J.E.: Describing the Cognitive Structures of Learners following Instruction in Chemistry. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change Orlando etc.: Academic Press, 1985, 29-49
G1;G6

WEST, L.H.T., FENSHAM, P.J.: Prior Knowledge and the Learning of Science. A Review of Ausubels' Theory of this Process. In: Studies in Science Education 1, 1974, 61-81
G1

WEST, L.H.T., PINES, A.L. How 'Rational' is Rationality? Science Education 67, 1983, 37-39
G1

WEST, L.H.T., PINES, A.L. (ED.): Cognitive Structure and Conceptual Change. Orlando, San Diego etc.: Academic Press, 1985
G1

WEST, L.H.T.: Towards Descriptions of the Cognitive Structures of Science Students. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 342-348
G1;G6

WHEELER, A.E.: Misconceptions in Elementary Science - A Kellyian Perspective. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 304-309
G1;G6;P;EN

WHITE, R.T.: The importance of context in educational research. Research in Science Education 16, 1986, 92-102
G1

WHITE, R.T.: The Future of Research on Cognitive Structure and Conceptual Change. American Educational Research Association, Washington D.C., April 1987
G1

WILKENING, F., ANDERSON, N.H.: Comparison of Two Rule Assessment Methodologies for Studying Cognitive Development. Center for Human Information Processing. University of California, San Diego, 1980
G1

WITTROCK, M.C.: Cognitive Processes in the Learning and Teaching of Science. Paper presented at the AERA annual meeting, Chicago, 1985
G1

WITTROCK, M. : Learning Science by Generating New Conceptions From Old Ideas. In: WEST, PINES (Ed.):Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 259-266
G1

ZIETZ, K.: Die Physik des Kindes. In: Die Deutsche Schule 40, 1936, 263-269
G1;G6

ZIETZ, K.: Zur Entwicklung des kausalen Denkens bei Kindern. In: Zeitschrift für angewandte Psychologie und Charakterkunde 57, 1939, 60-68
G1;G6

G3 ALLTAGSVORSTELLUNGEN UND WISSENSCHAFTLICHE VORSTELLUNGEN

EVERYDAY NOTIONS AND SCIENTIFIC NOTIONS

BÖHME, G.: Die Verwissenschaftlichung der Erfahrung. Wissenschaftsdidaktische Konsequenzen. In: BÖHME, G., ENGELHARDT, M. v. (Hrsg.): Entfremdete Wissenschaft. Frankfurt/Main: Suhrkamp, 1979, 114-136
G2;G3

DREYFUS, A.: L'education scientifique comme intermediaire entre la pensee scientifique et la vie de tous les jours: Une role controversable. In: Giordan, A., Martinand, J.-L.(Hrsg.): Education scientifique et vie quotidienne, 1986, 557-564
G3

GIL, D., FURIO-MAS, C.: La vie quotidienne contre la pensee scientifique. In: Giordan,A., Martinand, EJ.-L.(Hrsg.): Education scientifique et vie quotidienne, 1986, 515-520
G3

HEWSON, M.G., HAMLYN, D.: The Influence of Intellectual Environment on Conceptions of Heat. European Journal of Science Education 6, 1984, 254-262
G3;G6;P;T

JUNG, W.: Lebensweltliche und wissenschaftliche Vorstellungen. In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 64-84
G3

LIN, H.: A "Cultural" Look at Physics Students and Physics Classrooms - An Example of Anthropological Work in Science Education. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 194-218
G1;G3

MEHEUT, M., SERE, M.G., TIBERGHIEN, A.: Les etats de la matiere: du vecu a la physique ... et retour. In: Giordan, A., Martinand, J.-L.(Hrsg.): Education scientifique et vie quotidienne, 1986, 121-130
G3

MERTEN, S.: Das Forschen eines Kindes. In: Neue Sammlung 4, 1970., 427-436
G3

REDEKER, B.: Zum Anfang des Physiklernens. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1983. Gießen: 1.Physikalisches Institut, 1983, 356-367
G1;G3

RUMPF, H.: Schullernen und die Bedrohung der Identität. In: RUMPF, H.: Unterricht und Identität. München: Juventa, 1976, 9-28
G3

SACHSSE, H.: Was ist die naturwissenschaftliche Bildung ? In: Der mathematische und naturwissenschaftliche Unterricht 29, 1976, 260-271
G3

SOLOMON, J.: Is Physics Easy? In: Physics Education 18, 1983, 155-160
G3;G4

WAGENSCHEIN, M.: Der Ruf des Raben. In: WAGENSCHEIN, M.: Ursprüngliches Verstehen und exaktes Denken I. Stuttgart: Klett, 1970/2, 16-21
G3

WAGENSCHEIN, M.: Kinder auf dem Wege zur Physik. Zusammengetragene Geschichten von Kindern im Vorschulalter. In: WAGENSCHEIN, M., BANHOLZER, A., THIEL, S.: Kinder auf dem Wege zur Physik. Stuttgart: Klett, 1973
G3

G3 GESCHICHTLICHE UND INDIVIDUELLE ENTWICKLUNG VON VORSTELLUNGEN

DEVELOPMENT OF NOTIONS IN THE HISTORY OF SCIENCE AS COMPARED TO DEVELOPMENT OF NOTIONS IN INDIVIDUALS

BÖHME, G.: Thesen zur Schwellenproblematik bei Entstehung und Vermittlung physikalischen Wissens. Unveröffentlichtes Papier zum Werkstatttreffen "Schülervorstellungen", IPN, Kiel, 1977
G3

BÖHME, G.: Die Verwissenschaftlichung der Erfahrung. Wissenschaftsdidaktische Konsequenzen. In: BÖHME, G., ENGELHARDT, M. v. (Hrsg.): Entfremdete Wissenschaft. Frankfurt/Main: Suhrkamp, 1979, 114-136
G2;G3

CAREY, S.: Cognitive science and science education. American Psychologist 10, October 1986, 1123-1130
G1;G3

CLEMENT, J.: A Conceptual Model Discussed by Galileo and Used Intuitively by Physics Students. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey, London: Lawrence Erlbaum, 1983, 325-339
G3;G6;P;M

HEEGE, R.: Konvergente Beschreibungen von Bewegungsphänomenen bei Aristoteles und bei Kindern. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1981. Gießen: I.Physikalisches Institut, 1981, 98-99
G1;G3

HEEGE, R.: Was bedeutet "aristotelisches Denken" bei Kindern ? In: physica didactica 8, 1981, 209-216
G1;G3

JUNG, W.: Cognitive science and history of science. Paper presented at the Munich Conference 04.06.1986
G1;G3

LYTHCOTT, J.: Aristotelian was given as the answer, but what was the question? American Journal of Physics 53, 1985, 428-432
G3

LYTHCOTT, J.: "Aristotelian" Was Given as the Answer, But What Was the Question. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 257-266
G1;G3

McCLOSKEY, M.: Naive Theories of Motion. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey, London: Lawrence Erlbaum, 1983, 299-324
G3;G6;P;M

NUSSBAUM, J.: Classroom Conceptual Change: The Lesson to be Learned from the History of Science. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 272-281
G3

PIAGET, J.: Biology and Knowledge. Edinburgh: University Press, 1971
G3

PIAGET, J.: Physical World of the Child. In: Physics today, June 1972
G3

PIAGET, J.: The Principles of Genetic Epistemology. Basic Books, New York, 1972
G3

PIAGET, J.: Comments on Mathematical Education. In: HOWSON, A.G. (Ed.): Developments in Mathematical Education. Cambridge University Press, 1973
G3

PREECE, P.F.W.: Intuitive Science: Learned or Triggered? In: European Journal of Science Education 6 (1), 1984, 7-10
G1;G3

SALTIEL, E., VIENNOT, L.: What Do We Learn from Similarities Between Historical Ideas and the Spontaneous Reasoning of Students? In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 199-214
G3

VERGNAUD, G., HALBWACHS, F., ROUCHIER, A.: Structure de la matiere enseignee histoire des science et developpement conceptuel chez l'eleve. In: Revue Francaise de Pedagogie 45, 1978, 7-18
G1;G3

WISER, M., CAREY, S.: When Heat and Temperature Were One. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey, London: Lawrence Erlbaum, 1983, 267-297
G3

G4 SPRACHE UND VORSTELLUNGEN

LANGUAGE AND NOTIONS

ALBRECHT, E.: Bestimmt die Sprache unser Weltbild ? Kritik der gegenwärtigen bürgerlichen Sprachphilosophie. Frankfurt: Verlag Marxistische Blätter, 1972
G4

BACH, S.: Systematische und empirische Untersuchungen über das Verhältnis von Umgangssprache und Fachsprache im gymnasialen Physikunterricht. Dissertation, Universität Hamburg, 1984
G4

BACH, S.: Zyklische Bedeutungsvertauschung zwischen einigen physikalischen Grundbegriffen - semantische und syntaktische Aspekte des Problems. In: Wiebel, K.H.(Hrsg): Zur Didaktik d. Physik u. Chemie; Vorträge auf der Tagung für Didaktik der Physik/Chemie, Oldenburg, 1986, 223-228
G4

BELL, B., FREYBERG, P.: Language in the science classroom. In: Osborne, R., Freyberg, P.: Learning in science; The implications of children's science, 1985, 29-40
G4;G5;G7;B

BORN, G., WEBER, R.: Umgangssprachliche Verwendung physikalischer Begriffe. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1976. Gießen: I. Physikalisches Institut, 1976, 280-288
G4;G6

CASSELS, J.R.T., JOHNSTONE, A.H.: The Meaning of Words and the Teaching of Chemistry. In: Education in Chemistry 1, 1983, 10-11
G4

DROZD, L., SEIBICKE, W.: Deutsche Fach- und Wissenschaftssprache. Wiesbaden: Brandstetter, 1973
G4

DUIT, R.: Strom - ein Wort der Alltagssprache und der Fachsprache. In: Naturwissenschaften im Unterricht - Physik/Chemie 31 (10), 1983, 344-347
G4;G6;E;P

DUIT, R.: Vom Wort der Alltagssprache zum Fachterminus. Eine empirische Untersuchung zum Erlernen physikalischer Begriffe in der S I. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1982. Gießen: I. Physikalisches Institut, 1982
G4;G6;M;P

DUIT, R.: Kraft, Arbeit, Leistung, Energie - Wörter der Alltagssprache und der physikalischen Fachsprache. In: physica didactica 11, 1984, 129-144
G4;G6;P;M;EN

DUIT, R.: The Meaning of Current and Voltage in Everyday Language and its Consequences for Understanding the Physical Concepts of the Electric Circuit. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 205-214
G4;G5;G6;P;E

DUIT, R.: Work, Force and Power - Words in Everyday Language and Terms in Mechanics. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 227-233
G4;G6;P;M;EN

GERLACH, W.: Die Sprache der Physik. Bonn: Dümmler, 1962
G4

GIPPER, H.: Die Farbe als Sprachproblem. In: Sprachforum, Zeitschrift für angewandte Sprachwissenschaft 1, 1955, 135-146
G4

GIPPER, H.: Die Kluft zwischen muttersprachlichem und physikalischem Weltbild. In: Physikalische Blätter 12, 1956, 97-106
G4

GIPPER, H.: Muttersprachliches und wissenschaftliches Weltbild. In: Sprachforum, Zeitschrift für angewandte Sprachwissenschaft 2, 1956, 1-10
G4

GIPPER, H.: Sprache, Schlüssel zur Welt. Düsseldorf: Schwann, 1959
G4

GIPPER, H.: Muttersprachliche Wirkungen auf die wissenschaftliche Begriffsbildung und ihre Folgen. In: Archiv für Begriffsgeschichte 9, 1964, 243-258
G4

GIPPER, H.: Zur Problematik der Fachsprachen. Ein Beitrag aus sprachwissenschaftlicher Sicht. In: GIPPER, H.: Denken ohne Sprache? Düsseldorf: Schwann, 1971, 106-123
G4

GIPPER, H.: Gibt es ein sprachliches Relativitätsprinzip ? Untersuchungen zur Sapir-Whorf-Hypothese. Frankfurt/Main: Fischer, 1972
G4

GÖBEL, R.: Methodische Probleme der Erarbeitung und Festigung qualitativer Merkmale von Begriffen im Physikunterricht. Physik in der Schule 24, 1986, 274-281
G1;G4

HANNAWAY, O.: The Chemists and the Word. The Didactic Origins of Chemistry. The Johns Hopkins University Press, Baltimore and London, 1975
G4

HEEGE, R.: Sprachliche Randbedingungen in der Physikdidaktik. In: physica didactica 4, 1977, 79-83
G4

HEEGE, R.: Sprache - Wahrnehmung - Information und Fachdidaktik. Frankfurt/Main: Lang, 1979
G4

HEEGE, R.: Vorstellung, Reflexion, Intuition und die Genese physikalischer Begriffe. In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 132-160
G4

HEISENBERG, W.: Sprache und Wirklichkeit in der modernen Physik. In: Wort und Wirklichkeit, 6. Folge des Jahrbuchs Gestalt und Gedanke, herausgegeben von der Bayerischen Akademie der Schönen Künste. München: Oldenbourg, 1960, 32-62
G4

HELLER, B.: Sprachliche und logische Probleme des physikalischen Denkens. In: Beiträge zum mathematischen und naturwissenschaftlichen Unterricht, Heft 17, 1969, 3-27
G4

HENLE, P. (Hrsg.): Sprache, Denken, Kultur. Frankfurt/Main: Suhrkamp, 1975
G4

HEWSON, M.G.: The Role of Intellectual Environment in the Origin of Conceptions: an Explanatory Study. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 153-161
G1;G4;G6;P;T;

HUMBOLDT, W. v.: Über die Verschiedenheit des menschlichen Sprachbaues und ihren Einfluß auf die geistige Entwicklung des Menschengeschlechts. Faksimile-Druck nach der Originalausgabe von 1836. Bonn: Dümmler, 1968
G4

HÄUSLING, A.: Was heißt eigentlich Sachlernen? SMP 14, Nr. 7, 1986
G1;G4;G7
HÖPP, G.: Evolution der Sprache und Vernunft. Heidelberg: Springer, 1970
G4
HÜBNER, K.: Über Versuche, aus der Quantenmechanik eine neue Logik herzuleiten. In: LORENZ, K. (Hrsg.): Konstruktionen versus Positionen, Bd.1. Berlin, New York: de Gruyter, 1979, 278-289
G4
JUNG, W.: Fachdidaktische Aspekte des Kategorienproblems. In: JUNG, W.: Aufsätze zur Didaktik der Physik und Wissenschaftstheorie. Frankfurt/Main: Diesterweg, 1979, 94-120
G4
KAINZ, F.: Das Denken und die Sprache. In: Handbuch der Psychologie, Bd.1, 2.Halbband. Göttingen: Verlag für Psychologie, 1966, 564-614
G4
KAINZ, F.: Über die Sprachverführung des Denkens. Berlin: Duncker und Humblot, 1972
G4
KAMLAH, W., LORENZEN, P.: Logische Propädeutik oder Vorschule des vernünftigen Redens. Mannheim: Bibliographisches Institut GA, 1967
G4
KUBLI, F.: Anschauungsmittel und Sprache im Unterricht: eine erkenntnispsychologische Betrachtung. In: Naturwissenschaften im Unterricht - Physik/Chemie 1, 1981, 13-17
G4
LOCH, W.: Sprache. In: SPECK, J., WEHLE, G.: Handbuch pädagogischer Grundbegriffe, Bd.II. München: Kösel, 1970, 481-528
G4
LOGAN, P.: Language and Physics. In: Physics Education 16, 1981, 74-77
G4
LUTHER, W.: Sprachphilosophie als Grundwissenschaft. Heidelberg: Quelle & Meyer, 1970
G4
LYNCH, P.P., CHIPMAN, H.H., PACHAURY, A.C.: The Language of Science and the High School Student: The Recognition of Concept Definitions. Journal of Science and Mathematics Education in S.E. Asia, 12, No. 2, 1984, 7-14
G4;G6
MORI, I., KOJIMA, M., TADANG, N.: The effect of language on a child's conception of Speed: a Comparative Study on Japanese and Thai Children. Science Education 60, 1976, 531-534
G4;G6;P;M
MORI, J., KITAGAWA, O., TADANG, N.: The Effect of Language on a Child's Forming of Spatio-Temporal Concept: On Comparing Japanese and Thai Children. Science Education 58, 1974, 523-529
G4
NAUMER, H.: "Elektronenwolke" oder "Orbital" ? In: Praxis der Naturwissenschaften Chemie 24, 1975, 197-207
G4
NAY, U.: Fachspezifische Nomenklatur als Beitrag zur Entfremdung zwischen Kind und Umwelt. In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1977, 122-124
G4
PFUNDT, H.: Die Diskrepanz zwischen muttersprachlichem und wissenschaftlichem "Weltbild": ein Problem der Naturwissenschaftsdidaktik. In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 114-131
G4

PFUNDT, H.: Fachsprache und Vorstellungen der Schüler - dargestellt an Beispielen aus dem IPN-Lehrgang "Stoffe und Stoffumbildungen". In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 161-181
G4

PINES, A.L.: Towards a Taxonomy of conceptual Relations and the Implications for the Evaluation of Cognitive Structures. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 101-116
G1;G4

RANG, O.: Die Sprache als Hindernis beim Verstehen physikalischer Sachverhalte. In: Physikalische Blätter 26, 1970, 241-246
G4

RANG, O.: Zur negativen Transferwirkung von Schultradition und Muttersprache auf das Physikverständnis. In: Der Physikunterricht 9 (2), 1975, 65-71
G4

RANG, O.: Die Sprache als Verständigungshindernis in der Physik und Technik. In: Der Mensch - Krone der Schöpfung oder ihr Totengräber. Mannheimer Vorträge 1978/79, 4-14
G4

RAPOPORT, A.: Newtons Physik und die Flugschüler. In: HAYAKAWA, S. (Hrsg.): Wort und Wirklichkeit. Darmstadt: Verlag Darmstädter Blätter, o.Jg., 123-146
G4;G6;P;M

SCHAEFER, G., LOCH, W. (Hrsg.): Kommunikative Grundlagen des naturwissenschaftlichen Unterrichts. Weinheim und Basel: Beltz, 1980
G4

SCHULTE, W.: Zur Bedeutung der Sprache im Physikunterricht. Untersuchungen über den Einfluß des Unterrichts auf das Verständnis physikalischer Termini. Diplomarbeit, Göttingen, 1980
G4,G6

SEIFFERT, H.: "Verständlichkeit" der Wissenschaft: dialektisch - sprachanalytisch - hermeneutisch. In: Neue Sammlung 10, 1970, 275-289
G4

SOLOMON, J.: Is Physics Easy? In: Physics Education 18, 1983, 155-160
G2;G4

SPRECKELSEN, K.: Konzeptdeterminierung und Phänomenorientierung. Zwei widerstreitende Konzeptionen? In: chimica didactica 9, 1983, 75-80
G4

STENHOUSE, D.: Conceptual change in science education: Paradigms and Language-Games. Science Education 70(4), 1986, 413-425
G1;G4

SUTTON, C.: Science, Language and Meaning. In: The School Science Review 62, 1980/81, 47-56
G4

TOUGER, J.S.: Analyzing the Linguistic Structure of Physical Concepts: Possible Implications for Educational Research and for Physics Pedagogy. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 403-410
G4;G5

TOUGER, J.S.: A case study in the linguistic structure of physics discourse. Proceedings of the International Conference "Communicating Physics", Duisburg, August 1985
G4

VOLLMER, G.: Über Beziehungen der chemischen Unterrichtssprache zur Gemeinsprache. In: chimica didactica 3, 1977, 9-15
G4

VOLLMER, G.: Die Analyse einer Tageszeitung auf ihre chemiefachliche Inhaltskomponente. In: Naturwissenschaften im Unterricht - Physik/Chemie 26, 1978, 280-283
G4

VOLLMER, G.: Sprache und Begriffsbildung im Chemieunterricht. Diesterweg, Sauerländer, 1980
G4

VOORDE, H.H. ten.: Education Based on a New Concept of Teaching in Chemistry. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 310-319
G4;G7;C

WAGENSCHEIN, M.: Die Sprache im Physikunterricht. In: Ursprüngliches Verstehen und exaktes Denken, Bd.2 Stuttgart: Klett, 1970, 158-173
G4

WAGENSCHEIN, M.: Naturwissenschaftliche Bildung und Sprachverlust. In: Neue Sammlung 11, 1971, 497-507
G4

WEIN, H.: Sprache und Wissenschaft. In: Sprache und Wissenschaft. Vorträge gehalten auf der Tagung der Joachim Jungius-Gesellschaft der Wissenschaften in Hamburg 1959. Göttingen: Vandenhoeck und Ruprecht, 1960, 13-41
G4

WEIN, H.: Sprache und Weltbild. In: Westermanns Pädagogische Beiträge 17, 1965, 1-12
G4

WEISGERBER, L.: Vom Weltbild der deutschen Sprache. Düsseldorf: Schwann, 1953
G4

WEISGERBER, L.: Das Warten der Welt als sprachliche Aufgabe der Menschheit. In: Sprachforum 1, 1955, 10-19
G4

WEISGERBER, L.: Die sprachliche Gestaltung der Welt. Düsseldorf: Schwann, 1962/3
G4

WEIZSÄCKER, C.F. v.: Die Sprache der Physik. In: Sprache der Wissenschaft. Vorträge gehalten auf der Tagung der Joachim Jungius-Gesellschaft der Wissenschaften in Hamburg 1959. Göttingen: Vandenhoeck und Ruprecht, 1960, 137-153
G4

WENINGER, J.: Eindeutige Symbole im Chemieunterricht. In: Der Chemieunterricht 3, 1971, 99-118
G4

WENINGER, J.: Didaktische und semantische Probleme bei der Einführung der Atomhypothese und der Kern-Elektronhypothese. In: WENINGER, J., BRÜNGER, H. (Hrsg.): Atommodelle im naturwissenschaftlichen Unterricht, Bd.1 Weinheim und Basel: Beltz, 1977, 35-55
G4

WENINGER, J.: Grundsätzliches zu den sogenannten Reaktionsgleichungen. In: Naturwissenschaften im Unterricht - Physik/Chemie 27, 1979, 207-219
G4

WHORF, B.L.: Sprache, Denken, Wirklichkeit. Reinbek bei Hamburg: Rowohlt, 1971/8
G4

WOLFF, R.: Die Sprache der Chemie vom Atom bis Zyankali. Zur Entwicklung und Struktur einer Fachsprache. Bonn: Dümmler, 1971
G4

G5 METHODEN ZUR ERFASSUNG VON VORSTELLUNGEN

METHODS TO INVESTIGATE NOTIONS

AULT, C.R., NOVAK, J.D., GOWIN, D.B.: Constructing Vee Maps for Clinical Interviews on Molecule Concepts. Science Education 68, 1985, 441-462
G5;G6;P;AT

AULT, C.R.: Concept Mapping as a Study Strategy in Earth Science. Journal of College Science Teaching 15, 1985, 38-44
G5

BARZ, W., RIESCH, W., WESTPHAL, W.: Interviews mit Schülern am Beispiel von Untersuchungen von Lernvoraussetzungen für Physikunterricht. In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1974, 66-71
G5

BELL, B., FREYBERG, P.: Language in the science classroom. In: Osborne, R., Freyberg, P.: Learning in science; The implications of children's science, 1985, 29-40
G4;G5;G7;B

BELL, B., OSBORNE, R.J., TASKER, R.: Finding out what children think. In: Osborne, R., Freyberg, P.: learning in science; The implications of children's in science, 1985, 151-165
G5

BLISS, J., MONK, M., OGBORN, J. (EDS.): Qualitative Data Analysis for Educational Research. London, Canberra: Croom Helm, 1983
G5

BOEKAERTS, M.: Can the teacher unravel parts of a pupil's cognitive structure. Journal of Experimental Education, 48(1), 1979, 4-17
G5

BUCK, P.: "Astronomische" Methoden bei Begriffsbildungsuntersuchungen. In: MIKELSKIS, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie, 1984. Alsbach: Leuchtturm, 1985, 254-256
G5

CAILLOT, M., CHALOUHI, E.: Problem Solving in Electricity. Paper presented at the Annual Meeting of the American Educational Research Association in Montreal, 1983
G5;P;E

CARR, M.(ED.): A research method for science education based upon Interviews-About-Events. Working Paper 210. Learning in Science Project. University of Waikato, 1985
G5

CHAMPAGNE, A.B., GUNSTONE, R. , KLOPFER, L.E.: Effecting Changes in Cognitive Structure among Physics Students. In: WEST, PINES (Ed): Cognitive Structure and Conceptual Change Orlando etc: Academic Press, 1985, 163-187
G1;G5;G6;G7;P;M

CHAMPAGNE, A.B., HOZ, R., KLOPFER, L.E.: Construct Validation of the Cognitive Structure of Physics Concepts. Annual Meeting of the American Education Research Association, New Orleans, LA, April 1984
G5

CHAMPAGNE, A.B., KLOPFER, L.E.: Using the Consat: A Memo to Teachers. Learning Research and Development Center, University of Pittsburgh, 1980. (ERIC No.ED 198003)
G1;G5

CLEMENT, J.: Mapping a Student's Causal Conceptions from a Problem-Solving Protocol. In: LOCHHEAD, J., CLEMENT, J. (Eds.): Cognitive Process Instruction. Philadelphia: Franklin Institute Press, 1979, 133-146
G5

COCHAUD, G.A.M., THOMPSON, J.J.: Sequencing Science Material for Particular Classes. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 366-376
G5

CONFREY, J.: Using the Clinical Interview to Explore Students' Mathematical Understandings. A paper presented at the American Educational Research Association National Meeting. Los Angeles, 1981
G5

COSGROVE, M., OSBORNE, R.J.: Physical Change. Working Paper 210. Learning in Science Project. University of Waikato, 1985, 28-57
G5;G6;P;M

DAHNCKE, H., DUIT, R., RHÖNECK, C. v.: Methoden und Zwecke verschiedener Untersuchungen zur Erfassung der Vorstellungen von Schülern - Die Bew. einer Kugel in gebogenen Bahnen. In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 241-280
G5;G6;P;M

DELACOTE, G.: Classroom Based Research in Science and Mathematics Education. Response by F.R. Watson, 283-287. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 275-287
G5

DRIVER, R., ERICKSON, G.: Theories-in-Action: Some Theoretical and Empirical Issues in the Study of Students' Conceptual Frameworks in Science. Studies in Science Education 10, 1983, 37-60
G1;G5

DUIT, R., JUNG, W., RHÖNECK, C. V.: Understanding and teaching electricity - a guide to the workshop's papers. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 9-38
G5;G6;G7;P;E

DUIT, R.: Tests als Hilfsmittel zur statistischen Erfassung von Begriffsstrukturen auf dem Gebiet der Physik. In: Der Physikunterricht 2, 1971, 84-100
G5

DUIT, R.: Some Methods For Evaluating the Meaning of Concept Names. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 141-149
G5

DUIT, R.: The Meaning of Current and Voltage in Everyday Language and its Consequences for Understanding the Physical Concepts of the Electric Circuit. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 205-214
G4;G5;G6;P;E

DUIT, R.: Students' Representations of the Topological Structure of the Simple Electric Circuit. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 83-93
G5;G6;P;E

DUNN, C.S.: The Influence of Instructional Methods on Concept Learning. In: Science Education 67, 1983, 647-656
G5

EASLEY, J. : The Structural Paradigm in Protocol Analysis. In: Journal of Research in Science Teaching 11 (3), 1974, 281-290
G5

EASLEY, J. : Naturalistic Case Studies exploring social-cognitive Mechanisms and some Methodological Issues in Research on Problems of Teachers. Journal of Research in Science Teaching 19, 1982, 191-203
G5

ENGELHARDT, P., JUNG, W., WIESNER, H.: Welche Beziehungen sehen Studenten zwischen Begriffen aus der Mechanik bzw. Thermodynamik ? In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1976, 249-258
G5;G6;M;T;P

ERICKSON, G. : Theoretical and Empirical Issues in the Study of Students' Conceptual Frameworks. Paper prepared for a Conference on The Representation of Cognitive Stuctures held at O.I.S.E., Toronto, Ontario, 1984
G5

FEHER, E., RICE, K.: Development of Scientific Concepts through the Use of Interactive Exhibits in a Museum. American Museum of Natural History, 1985, 35-46
G5;G6;P;O

FELDSINE, J.N. JR.: Concept Mapping: A Method for Detection of Possible Student Misconceptions. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 467-472
G5

FINLEY, F.N., STEWART, J.: Representing Substantive Structures. Science Education 1982, 593-611
G5

FINLEY, F.N.: Students Recall from Science Text. Journal of Research in Science Teaching 21, 1984, 247-259
G5

FINLEY F.N.: Using Propositions from Clinical Interviews as Variables to compare Student Knowledge. Journal of Research in Science Teaching 21, 1984, 809-818
G5

FREDETTE, N.: The Clinical Interview: A Tool for Investigating Student Knowledge and Ideas. In: DUIT, R., JUNG, W., RHONECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 175-184
G5

FREY, K., PFUNDT, H., LEHRKE, M., BAYRHUBER, H., JENELTEN-ALLKOFER, C.: Nutzung psychologischer Methoden und Erkenntnisse bei der Vorbereitung naturwissenschaftlicher Curricula. Kiel: IPN, polykop, 1982
G1;G5;G6;C

GILBERT, J.K., OSBORNE, R.J.: Identifying Science Students' Concepts: The Interview-About-Instance Approach. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 244-251
G5;G6;E;P

GILBERT, J.K., WATTS, M., OSBORNE, R.J.: Eliciting Student Views using an Interview-About-Instances Technique. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc.: Academic Press, 1985, 11-27
G5

GLINER, G.S.: A Note on a Statistical Paradigm for the Evaluation of Cognitive Structure in Physics Instruction. Applied Psychological Measurement 5, 1981, 493-502
G5

GOLDBERG, F.M., MCDERMOTT, L.C.: Not All the Wrong Answers Students Give Represent Misconceptions: Examples from Interviews on Geometrical Optics. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 335-345
G5

GOLDBERG, F.M.: Investigating student understanding in physics with an interactive videodisc. Paper presented at AERA Meeting, Washington DC, April 20, 1987
G5

GORODETSKY, M., GUSSARSKY, E.: Misconceptualization of the chemical equilibrium concept as revealed by different evaluation methods. European Journal of Science Education, Vol. 8, No. 4, 1986, 427-441
G5;G6;C

GUESNE, E., SERE, M.G., TIBERGHIEN, A.: Investigations on Children's Conceptions in Physics: Which Method for Which Result? In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 420-424
G5

GUNSTONE, R. , WHITE, R.T.: Assessing Understanding by means of Venn Diagrams. Science Education 70(2), 1986, 151-158
G5

HAGSTEDT, H., SPRECKELSEN, K.: Wie Kinder physikalischen Phänomenen begegnen. SMP 14, Nr. 9, 1986, 316-323
G5;G6

HEAD, J.O., SUTTON, C. : Language, Understanding and Commitment. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc.: Academic Press, 1985, 91-100
G1;G5

HELM, H.: Misconceptions' Research: A Problem oriented Perspective. Paper prepared for a symposium: Perspectives on Cognitive Structure and Conceptual Change at the 1985 AERA Annual Meeting, Chicago, 1985
G1;G5

HEWSON, P.W.: Microcomputers and Conceptual Change: The Use of a Microcomputer Program to Diagnose and Remediate an Alternative Conception of Speed. Paper presented at the Annual Meeting of the American Educational Research Association. Montreal, April 1983
G5;G7;P;M

HOFFMANN, K., JUNG, W., WIESNER, H.: Welche Informationen liefern Assoziationen von Schülern für den Physikunterricht ? In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1975, 279-288
G5

HOZ, R.: Enhancement and Assessment of the Reliability of Instruments for the Measurement of Conceptual Framework. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 153-162
G5

ISA, A.M., MASKILL,R.: A comparison of Science Word Meaning in the Classrooms of two different Countries: Scottish Integrated Science in Scotland and in Malaysia. British Journal of Educational Psychology 52,1982, 188-198
G5

JOCHEMS, W.: Methodologische aspecten van protocolanalyse. Tijdschrift voor Didactiek der ß-wetenschappen, Nr. 1, jaargang 4, 1986, 1-18
G5

JOHANSSON, B., MARTON, F., SVENSSON, L.: An approach to describing learning as change between qualitatively different conceptions. In: West, L.H.T., Pines, A.L.(Hrsg.): Cognitive structure and conceptual change, 1985, 233-257
G1;G5

JUNG, W.: Zum Problem der "Schülervorstellungen". In: physica didactica 6 (3), 1978, 125-146, physica didactica 5 (4), 1978, 231-248
G1;G5;G6;P;M

JUNG, W.: Some Methods of Inquiry into Knowledge Structures in Mechanics. In: Proceedings of the International workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 254-267
G5

JUNG, W.: Assoziationstests und verwandte Verfahren. In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 196-222
G5

JUNG, W.: Sprache und Physiklernen. Zur Beschreibung von Bewegung. In: Naturwissenschaften im Unterricht - Physik/Chemie 31 (10), 1983, 335-339
G5;G6;P;M

JUNG, W.: Category Questionnaire - the Technique and Some Results. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 197-204
G5;G6;P;E

JUNG, W.: Die Methode des lauten Denkens. In: MIKELSKIS, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie, 1984. Alsbach: Leuchtturm, 1985, 257-259
G5

JUNG, W.: An Example of the Speaking - Aloud Technique in the Domain of Electricity. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 185-195
G5;G6;P;E

JUNG, W.: Verständnisse und Mißverständnisse. physica didactica 14(1/2), 1987, 23-30
G1;G5;G6;P;O

JUNG, W.: Versuche mit der Methode des "lauten Denkens" bei physikalischen Problemen. Arbeitspapier, Institut für Didaktik der Physik, Universität Frankfurt /M., n.d.
G5;G6;P;O;E

KEMPA, R.F., NICHOLLS, C.E.: Problem Solving Ability and Cognitive Structure - an Exploratory Investigation. European Journal of Science Education 5, 1983, 171-184
G5

KUBLI, F.: Piaget's Clinical Experiments and Some Conclusions for Science Teaching. In: Proceedings of the International workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 92-105
G1;G5

KUBLI, F.: Piagets Methode des "kritischen Interviews" und ihre Bedeutung für die Reflexion des Physikunterrichts. In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 223-240
G5

KÄRRQVIST, C.: The Development of Concepts by means of Dialogues centred on Experiments. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 215-226
G5;G6;P;E

LARKIN, J. , RAINARD, B.: A Research Methodology for Studying how People Think. Journal of Research in Science Teaching 21, 1984, 235-254
G5

LUCAS, A.M., MCMANUS, P., THOMAS, G.: Investigating learning from informal sources: Listening to conversations and observing play in science museums. European Journal of Science Education, Vol. 8, No. 4, 1986, 341-352
G5

MAICHLE, U.: Wissen und Verstehen im Physikunterricht: Diagnose auf kognitionspsychologischer Grundlage. In: Bleichroth, W.(Hrsg.): Aufsätze zur Didaktik der Physik. physica didactica 13, Sonderheft, 1986, 63-66
G1;G5

MARTON, F.: Phenomenography - describing conceptions of the world around us. Instructional Science 10, 1981, 177-200,
G1;G5

MASKILL, R., PEREIRA, D.: Cognitive Structure from Digraph Analysis of Language. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 349-355
G5

MATTHEWS, G.P., BROOK, V.G., KHAN-GANDAPUR, T.H.: Cognitive Structure Determination as a tool in Science Teaching. Part 2. The Measurement of Piaget-specific Levels. European Journal of Science Education 6, 1984, 289-297
G5

MATTHEWS, G.P., BROOK, V.G., ELLIOT, G.S., KAHN-GANDAPUR, T.H.: Cognitive Structure Determination as a Pool in Science Teaching. Part 3. Results. European Journal of Science Education 7, 1985, 263-279
G5;G6

MATTHEWS, G.P., BROOK, V.G., KHAN-GANDAPUR, T.H.: Cognitive Structure Determinations as a Tool in Science Teaching. Part 1: A New Method of Creating Concept Maps. In: European Journal of Science Education 6 (2), 1984, 169-177
G5

MILES, M.B., HUBERMANN, A.M.: Drawing Valid Meaning from Qualitative Data: Toward a Shared Craft. In: Educational Researcher 13 (5), 1984, 20-30
G5

MOREIRA, M.A., SANTOS, C.A.: The Influence of Content Organization of Student's Cognitive Structure in Thermodynamics. Journal of Research in Science Teaching 18, 1981, 525-531
G5;G6;P;T

NAGY, P.: Assessing Cognitive Structure: A Response to Stewart. Science Education 67, 1983, 25-36
G5

NAGY, P. (ED.): The Representation of Cognitive Structures. Toronto: The Ontario Institute for Studies in Education, 1984
G5

NOVAK, J.D., GOWIN, D.B., JOHANSEN, G.T.: The Use of Concept Mapping and Knowledge Vee Mapping With Junior High School Science Students. In: Science Education 67, 1983, 625-645
G5

NOVAK, J.D.: Metalearning and Metaknowledge Strategies to help Students learn how to learn. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 189-209
G1;G5

OGBORN, J.: Some Uses of Networks of Options for Describing Complicated Qualitative Data. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 359-368
G5

OSBORNE, R.J., FREYBERG, P.: Children's science. Osborne, R., Freyberg, P.: Learning in science. The implications of children's science, 1985, 1-14
G1;G5

OSBORNE, R.J., GILBERT, J.K.: An Approach to Student Understanding of Basic Concepts in Science. Institute for Educational Technology, University of Surrey, 1979
G5

OSBORNE, R.J., GILBERT, J.K.: A Method for Investigating Concept Understanding in Science. In: European Journal of Science Education 2 (3), 1980, 311-321
G5

OSBORNE, R.J., GILBERT, J.K.: A Technique for Exploring Students' Views of the World. In: Physics Education 15 (6), 1980, 376-379
G5

PINES, A.L., NOVAK, J.D., POSNER, G., VANKIRK, J.: The Clinical Interview: A Method for Evaluating Cognitive Structure. Research report No.6, Cornell University, Ithaca, N.Y., 1978
G5

PINES, A.L., NOVAK, J.D.: The Interaction of Audio-Tutorial Instruction with Student Prior Knowledge: a proposed qualitative, Case Study Methodology. Science Education 69, 1985, 213-228
G5

PINES, A.L.: Protocols as Indicators of Cognitive Structure: A Cautionary Note. In: Journal of Research in Science Teaching 17 (4), 1980, 361-362
G5

PREECE, P.F.W.: Science Concepts in Semantic Space - a Multidimensional Scaling Study. The Alberta Journal of Educational Research, 1976, 281-288
G5

PREECE, P.F.W.: Associative Structure of Science Concepts. British Journal of Educational Psychology 46, 1976, 174-183
G5

PREECE, P.F.W.: Mapping Cognitive Structure: A Comparison of Methods. In: Journal of Educational Psychology 68 (1), 1976, 1-8
G5

PREECE, P.F.W.: Exploration of Semantic Space. Review of Research on the Organisation of Scientific Concepts in Semantic Memory. In: Science Education 62, 1978, 547-562
G1;G5

SCHUSTER, D.G.: Research Methodology in Investigations of Students' Conceptions in Science. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 234-238
G5

SCHWEDES, H.: Die Bestimmung der emotionalen Bedeutung physikalischer Begriffe mit Hilfe des semantischen Differentials. In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1973, 72-86
G5

SCHÄFER, K.: Von der Alltagserfahrung zur Newtonschen Mechanik. In: KUHN, W. (Hrsg): Didaktik der Physik. Vorträge der Physikertagung 1984. Gießen: DPG-Fachausschuß Didaktik der Physik, 1984, 166-172
G1;G5;G6;P

SHAVELSON, R.J.: Methods for Examining Representations of a Subject - Matter Structure in a Students' Memory. In: Journal of Research in Science Teaching 11, 1974, 231-249
G5

SHAVELSON, R.J.: The Measurement of Cognitive Structure. Paper presented in the Symposium on the "Psychology of Learning" at the annual meeting of the AERA, Chicago, 1985
G5

SHUELL, T.J.: Knowledge Representation, Cognitive Structure and School Learning: a Historical Perspective. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change Orlando etc: Academic Press, 1985, 117-130
G1;G5

SPRECKELSEN, K.: Zur Ermittlung von Schülervorstellungen im Grundschulalter. In: MIKELSKIS, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie, 1984. Alsbach: Leuchtturm, 1985, 236-238
G5

SPRECKELSEN, K.: Zur Analyse von Schüleräußerungen über einfache physikalische Phänomene In: Wiebel, K.H.(Hrsg): Zur Didaktik der Physik u. Chemie; Vorträge auf der Tagung f. Didaktik der Physik/Chemie, Oldenburg 1986, 164-166
G5

STEWART, J.: Content and Cognitive Structure: Critique of Assessment and Representation Techniques Used by Science Education Researches. In: Science Education 63 (3), 1979, 395-405
G5

STEWART, J.: Techniques for Assessing and Representing Information in Cognitive Structure. In: Science Education 64 (2), 1980, 223-235
G5

STUART, H. : Should Concept Maps be scored numerically? European Journal of Science Education 7, 1985, 73-81
G5

SUTTON, C.: The Learner's Prior Knowledge: A Critical Review of Techniques for Probing its Organisation. In: European Journal of Science Education 2, 1980, 107-120
G5

THEMAN, J.: The interview as a Research Instrument. Paper presented at the NFPF annual conference , October 26-28, 1979, Lillehammer, Norway. Reports from the Institute of Education, University of Göteborg
G5

TOUGER, J.S.: Analyzing the Linguistic Structure of Physical Concepts: Possible Implications for Educational Research and for Physics Pedagogy. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 403-410
G4;G5

TREAGUST, D.F.: Diagnostic Tests to Evaluate Student's Misconceptions in Science. Paper presented at the 58th Annual Meeting of the National Association for Research in Science Teaching, French Lick Spring, Indiana, April 15-18, 1985
G5

TROWBRIDGE, J.E., MINTZES, J.J.: Students' Alternative Conceptions of Animals and Animal Classification. School Science and Mathematics, 1985, 304-316
G5;B

WACHSMUTH, J.: Logical Analysis of Cognitive Organizational Structures. Paper presented at the 1985 Annual Meeting of the AERA in Chicago
G5

WATTS, M.: Suggestions for Generating and Designing Cards for the Interview About Instances Approach. Working Paper, Institute for Educational Technology, University of Surrey, 1980
G5

WATTS, M.: Exploring Pupils' Alternative Frameworks Using the Interview-About-Instances Method. In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 365-386
G5

WEST, L.H.T., FENSHAM, P.J., GARRARD, J.E.: Describing the Cognitive Structures of Learners following Instruction in Chemistry. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change Orlando etc.: Academic Press, 1985, 29-49
G1;G5

WEST, L.H.T.: Towards Descriptions of the Cognitive Structures of Science Students. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 342-348
G1;G5

WEST, L.H.T.: Concept Mapping. Paper prepared for a symposium: Perspectives on Cognitive Structure and Conceptual Change, at the 1985 AERA Annual Meeting, Chicago, 1985
G5;G7

WHITE, R.T.: Interview Protocolls and Dimensions of Cognitive Structure. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc.: Academic Press, 1985, 51-59
G5

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

P - Bereich der Physik	Area of physics
E - Elektrizität	- electricity

AALST, H. V.: The Differentiation Between Connections in Series and in Parallel from Cognitive Mapping; implications for Teaching. In:DUIT, R., JUNG, W., RHONECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 115-128
G6;G7;P;E

AMEH, C., GUNSTONE, R.: Teachers' Concepts in Science. Research in Science Education 15, Australian Science Education Research Association, 1985, 151-157
G6;G8;P;M;E;B

AMEH, C., GUNSTONE, R.: Science Teachers' concepts in Nigeria and Australia. In: Research in Science Education 16, 1986, 73-81
G6;G8;P;E;M;B

ANDERSSON, B.R.: Pupils' Understanding of Some Aspects of Energy Transfer. EKNA-project 1980. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1980
G6;P;M;E;T

ANDERSSON, B.R.: Wie Schüler einige Aspekte des Energietransfers im elektrischen Stromkreis verstehen. In: Der Physikunterricht 2, 1984, 32-36
G6;P;E

ANDERSSON, B.R.: Pupils' Reasoning With Regard to an Electromagnet. In: DUIT, R., JUNG, W., RHONECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 153-163
G6;P;E

ANDERSSON, B.R.: The experiental gestalt of causation: a common core to pupils preconceptions in science. European Journal of Science Education 2, 1986, 155-171
G1;G6;P;M;E;T;O

AUFSCHNAITER, S. V., DUIT, R., FILLBRAND, H., NIEDDERER, H.: Der einfache elektrische Stromkreis im 5. und 6. Schuljahr. In: Naturwissenschaften im Unterricht - Physik/Chemie 18, 1970, 135-149 und 182-188
G6;E;P

BRAUNER, R., PETERS, A.: Auffassungen, Vorstellungen und Begriffe von Kindern im Zusammenhang mit der Elektrizität und dem elektrischen Strom. In: Naturwissenschaften im Unterricht - Physik/Chemie 24, 1976, 185-187, 240-244, 323-327
G6;E;P

BUTTS, W.: Children's understanding of electric current in three countries. Research in Science Education 15, Australian Science Education Research Association, 1985, 127-130
G6;P;E

CAILLOT, M.: Science Cognitive et Didactique des Sciences Experimentales. Communication presentee aux 6emes Journees sur l'Enseignement Scientifique. Chamonix, Fevrier 1983
G6;P;E

CAILLOT, M., CHALOUHI, E.: Problemlösen im Bereich der Elektrizitätslehre. In: Der Physikunterricht 2, 1984, 36-45
G6;P;E

CAILLOT, M.: Problem Representations and Problem - Solving Procedures in Electricity. In: DUIT, R., JUNG, W., RHONECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 139-151
G6;P;E

CHALOUHI, E.: Mecanismes cognitifs utilise' par les eleves et leurs professeurs dans la resolution d'un probleme d'electrocinetique. Role de la conection du probleme, en classe, par les professeurs. These, Laboratoire Inter universitaire de Recherche sur l'Enseignement des Science Physiques et de la Technologie, Universite Paris VII, 1981
G1;G6;E;P

CLOSSET, J.L.: Sequential Reasoning in Electricity. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 313-319
G6;P;E

CLOSSET, J.L.: Woher stammen bestimmte "Fehler" von Schülern und Studenten aus dem Bereich der Elektrizitätslehre? Kann mann sie beheben? In: Der Physikunterricht 2, 1984, 21-31
G6;P;E

COHEN, R., EYLON, B., GANIEL, U.: Potential Difference and Current in Simple Electric Circuits: A Study of Students' Concepts American Journal of Physics, May 1983, 407-412
G6;P;E

COHEN, R.: Causual Relations in Electric Circuits: Students' Concepts. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 107-113
G6;G7;P;E

COSGROVE, M., OSBORNE,R.J.,CARR, M.: Childrens' Intuitive Ideas on Electric Current and the Modification of Those Ideas. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 247-256
G6;G7;P;E

DI SESSA, A.A.: Phenomenology and the Evolution of Intuition. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey, London: Lawrence Erlbaum, 1983, 15-33
G1;G6;P;E;M

DUIT, R.: Strom - ein Wort der Alltagssprache und der Fachsprache. In: Naturwissenschaften im Unterricht - Physik/Chemie 31 (10), 1983, 344-347
G4;G6;E;P

DUIT, R.: The Meaning of Current and Voltage in Everyday Language and Its Consequences for Understanding the Physical Concepts of the Electric Circuit. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 205-214
G4;G5;G6;P;E

DUIT, R.: Students' Representations of the Topological Structure of the Simple Electric Circuit. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 83-93
G5;G6;P;E

DUIT, R., JUNG, W., RHÖNECK, C. V.: Understanding and teaching electricity - a guide to the workshop's papers. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 9-38
G5;G6;G7;P;E

DUIT, R., JUNG, W., RHÖNECK, C. V. (ED.): Aspects of Understanding Electricity. Proceedings of an International Workshop in Ludwigsburg. Sept. 1984 IPN Arbeitsberichte 59. Kiel: IPN/Schmidt & Klaunig, 1985
G6;G7;P;E

DUIT, R.: Übersicht über Schülervorstellungen im Bereich der elementaren Elektrizitätslehre, Teil I: Zur Rolle der Alltagssprache u. zu Vorstellungen v. der topologischen Struktur elektrischer Stromkreise. IPN Seminar 34, Kiel: IPN, 1985
G6;P;E

DUIT, R.: Übersicht über Schülervorstellungen im Bereich der elementaren Elektrizitätslehre. IPN Seminar 34. Kiel: IPN, 1986

G6;P;E

ERLE, G.: Untersuchung von Lernvorgängen im Physikunterricht. In: Zeitschrift für Naturlehre und Naturkunde 16, 1968, 34-41

G6;P;E

FAUCHER, G.: Advanced Physics Cources Do Not Provide Students With Conceptual Change. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 322-327

G6;P;E;M;MAG

FEHER, E.: Identification of Certain Preconceptions That Hinder Science Learning: Examples Involving Electric Circuits. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 328-334

G6;P;E

FERGUSON-HESSLER, M., DE JONG, T.: On Success and Failure in the Solving of Problems in Electricity and Magnetism. Summer Workshop: Research on Physics Education. La Londe Les Maures, 1983

G6;P;E

FREDETTE, N., CLEMENT, J. : Textbook Problems and the Real World: Students Conceptions of a Problem Relating to an Electrical Circuit. Working Paper. Department of Physics and Astronomy. University of Massachusetts, Amherst, Mass., Feb. 1979

G6;P;E

FREDETTE, N., LOCHHEAD, J.: Student Conceptions of Simple Circuits. In: The Physics Teacher 18 (3), 1980, 194-198

G6;P;E

GAULD, C.F.: Models, Meters and Memory. Research in Science Education, 16, 49-54

G6;P;E

GENTNER, D., GENTNER, D.R.: Flowing Waters or Teeming Crowds: Mental Models of Electricity. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey, London: Lawrence Erlbaum, 1983, 99-129

G6;P;E

GILBERT, J.K., OSBORNE, R.J.: Identifying Science Students' Concepts: The Interview-About-Instance Approach. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 244-251

G5;G6;E;P

GOTT, R.: Electricity at Age 15: APU Science. Topic report 7. Assessment of Performance Unit. Leeds, n.d.

G6;P;E

GOTT, R.: The Place of Electricity in The Assessment of Performance in Science. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 49-61

G6;P;E

GOTT, R.: Predicting and Explaining the Operation of Simple DC Circuits. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 63-72

G6;P;E

HAMIDA, J.B.: Modeles de Fonctionnement de Circuits Electriques simples chez des Enfant de 12 Ans. These, Universite Paris VII, 1980

G6;P;E

HAUKE, B.: Ein an Schülervorstellungen orientierter Einstieg in die Elektrostatik. In: Naturwissenschaften im Unterricht - Physik/Chemie 29 (3), 1981, 103-109

G6;G7;P;E

HEEGE, R., SCHWANEBERG, R.: Zur Anschaulichkeit elektrischer und magnetischer Felder. In: Kuhn, W.(Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1985 München. DPG Fachausschuß Didaktik der Physik, 1985, 275-282
G6; P;E;FLD;MAG

HOLLA, E.: Deutung eines technischen Vorgangs durch Knaben einer 8. Volksschulklasse. In: Schule und Psychologie 10, 1963, 321-331
G6;P;E

JOHSUA, S.: La "metaphore du fluide" et le "raisonnement en courant". In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 321-330
G6;P;E

JOHSUA,S.: Students' Interpretation of Simple Electrical Diagrams. European Journal of Science Education 6, 1984, 271-275
G6;P;E

JOHSUA, S., DUPIN, J.J.: Schematic Diagrams, Representations and Type of Reasoning in Basic Electricity. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 129-138
G6;P;E

JORDAN, J., EBINGHAUS, H., JANETZKI, V.: Der Energietransport bei elektromagnetischen Vorgängen. Vorstellungen von Schülern und Studenten. In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1977, 159-162
G6;P;E

JUNG, W., WIESNER, H., KIOWSKI, I., WEBER, E.: Zum Anfangsunterricht in der Elektrizitätslehre. In: physica didactica 9, 1982, 257-272
G6;G7;P;E

JUNG, W.: An Example of the Speaking - Aloud Technique in the Domain of Electricity. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 185-196
G5;G6;P;E

JUNG, W.: Category Questionnaire - the Technique and Some Results. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 197-204
G5;G6;P;E

JUNG, W., VOSS, H.-P.: Zum Verständnis der elementaren Elektrizitätslehre. Kuhn, W.(Hrsg.): Didaktik der Physik; Vorträge, Physikertagung, Gießen, 1986, 257-263
G6;P;E

JUNG, W.: Erhebung zur Elektrizitätslehre (Kontrolluntersuchung). Arbeitspapier, Institut für Didaktik der Physik, Universität Frankfurt/M., n.d.
G6;P;E

JUNG, W.: Versuche mit der Methode des "lauten Denkens" bei physikalischen Problemen. Arbeitspapier, Institut für Didaktik der Physik, Universität Frankfurt /M., n.d.
G5;G6;P;O;E

KIRCHER, E., BUSCH, T.V.: Empirische Untersuchungen am elektrischen Stromkreis bei lernbehinderten Schülern. Universität Würzburg, 1984, 1-11
G6;P;E

KIRCHER, E.: Empirische Untersuchungen zum Spannungsbegriff in der S I. In: Wiebel, K.H.(Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge a. der Tagung für Didaktik der Physik/Chemie, Oldenburg, 1986, 242-244
G6;P;E

KARRQVIST, C.: The Development of Concepts by means of Dialogues centred on Experiments. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 215-226
G5;G6;P;E

KÄRRQVIST, C.: Kunskapsutveckling genom experiment-centrerade dialoger i ellära. Göteborg Studies in Educational Sciences 52. Acta Universitatis Gothenburgensis. Göteborg, 1985
G6;P;E

LICHT, P.: Concept Development in Electricity: A Strategy and some provisional Results. Paper prepared for the International Symposium on Physics Teaching. Universite Libre de Bruxelles, Nw 11-19, 1985
G6;G7;P;E

LOVELL, K.: Understanding of Scientific Concepts at Different Developmental Levels and a Technique for Investigating the Degree of Understanding. Illustrated by Reference to Electrostatic and Gravitational Potential. n.d.
G6;P;E;M

MAICHLE, U.: Schemata als Organisationsprinzipien beim Erwerb physikalischer Inhalte aus dem Bereich der Elektrizitätslehre. In: Naturwissenschaften im Unterricht - Physik/Chemie 27, 1979, 33-39
G6;P;E

MAICHLE, U.: Representation of Knowledge in Basic Electricity and its Use for Problem Solving. In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 174-193
G6;P;E

MCDERMOTT, L.C., ZEE, E. V.: Identifying and Adressing Student Difficulties With Electric Circuits. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 39-48
G6;G7;P;E

MAICHLE, U.: Wissen, Verstehen und Problemlösen im Bereich der Physik. Frankfurt am Main: Peter Lang, 1985
G1;G6;P;E

MCINTYRE, P.J.: Student's Use of Model in Their Explanations of Electrostatic Phenomena. In: Science Education 58 (4), 1974, 577-580
G6;P;E

NIEDDERER, H.: Sachstruktur und Schülerfähigkeiten beim einfachen elektrischen Stromkreis. IPN-Arbeitsberichte 2, 1973
G6;P;E

OLDHAM, V., BLACK, P., SOLOMON, J., STUART, H.: A study of pupil views on the dangers of electricity. European Journal of Science Education, Vol. 8, No. 2, 1986, 185-197
G6;P;E

PETERS, P.C.: Even honors Students have Conceptual Difficulties with Physics. American Journal of Physics 50, 1982, 501-508
G6;P;E;M

PREECE, P.F.W.: The Concepts of Electromagnetism: A Study of the Internal Representation of External Structures. In: Journal of Research in Science Teaching 13 (6), 1976, 517-524
G6;P;E

PRÜM, R.: How Do 12 Year Olds Approach Simple Electric Circuits? In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 227-234
G6;P;E

PSILLOS, D., KOUMARAS, P., VALLASIADES, O.: Teaching DC Circuits in order to affect conceptual change to gymnasium pupils. Proceedings, International symposium on physics teaching, Brussels, Nov. 1985
G6;P;E

RHÖNECK, C. V.: Schüleräußerungen zum Begriff der elektrischen Spannung beim Erklären realer Experimente. In: Der Physikunterricht 14 (4), 1980, 16-29
G6;P;E

RHÖNECK, C. V.: Students' Conceptions of the Electric Circuit Before Physics Instruction. In: Proceedings of the International workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 194-213
G6;P;E

RHÖNECK, C. V.: Semantic Structures Describing the Electric Circuit Before and After Instruction. In: Research on Physics Education. Proceedings of the first International workshop. La Londe les Maures, 1983, 303-312
G6;P;E

RHÖNECK, C. V., VÖLKER, B.: Vorstellungen vom Stromkreis und ihr Einfluß auf den Lernprozeß. In: Der Physikunterricht 2, 1984, 4-16
G6;P;E

RHÖNECK, C. V.: Semantische Strukturen in den Schülervorstellungen vom Stromkreis. In: KUHN, W. (Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1984. Gießen: DPG-Fachausschuß Didaktik der Physik, 1984, 206-208
G6;P;E;

RHÖNECK, C. V.: The Introduction of Voltage as an Independent Variable - the Importance of Preconceptions, Cognitive Conflict and Operating Rules. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 275-286
G6;P;E

RHÖNECK, C. V.: Forschungsschwerpunkt Schülervorstellungen - Methoden und Ergebnisse im Bereich der Elektrizitätslehre. In: MIKELSKIS, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie, 1984. Alsbach: Leuchtturm, 1985, 71-82
G6;P;E

RHÖNECK, C. v., VÖLKER, B.: Semantic Structures Describing the Electric Circuit - Before and After Instruction. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 95-106
G6;P;E

RHÖNECK, C.: Problemlösen und Schülervorstellungen im Bereich der einfachen Elektrizitätslehre. In: Mikelskis, H. (Hrsg): Zur Didaktik der Physik und Chemie. Vorträge der GDCP Tagung 1985. Alsbach: Leuchtturm, 1986, 215-217
G6;P;E

RHÖNECK, C.V.: Vorstellungen vom elektrischen Stromkreis. Duit, R., Jung, W., Rhöneck, C.v.(Hrsg.): Alltagsvorstellungen. Naturwissenschaften im Unterricht Physik/Chemie 34, 1986, 10-14
G6;P;E

RHÖNECK, C.V.: Problemlösen und Schülervorstellungen im Bereich der einfachen Elektrizitätslehre. Kuhn, W.(Hrsg): Didaktik der Physik; Vorträge, Physikertagung, Giessen 1986, 264-275
G6;P;E

RHÖNECK, CH. V. Schülervorstellungen im Bereich der Elektrizitätslehre als kognitive Strukturen. IPN Seminar 34. Kiel: IPN, 1986
G6;P;E

RILEY, M.S.: Structural Understanding and Problem - Solving Skill. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 165-176
G6;P;E

SCHULTE, W.: Die Wirksamkeit von Physikunterricht beim Erlernen physikalischer Termini. In: Naturwissenschaften im Unterricht - Physik/Chemie 30 (3), 1982, 97-100
G6;P;E

SCHWEDES, H., SCHILLING, P.: Schülervorstellungen zu Wasserstromkreisen. In: physica didactica 10, 1983, 159-170
G6;P;E

SCHWEDES, H.: Zur Kontinuitätsvorstellung bei Wasserstromkreisen und elektrischen Schaltungen. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1983. Gießen: 1.Physikalisches Institut, 1983, 264-269
G6;G7;P;E

SCHWEDES, H.: The Importance of Watercircuits in Teaching Electric Circuits. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Eds.): Understanding Electricity - Proceedings of a Workshop. Pädagogische Hochschule Ludwigsburg, 1984
G6;P;E

SHIPSTONE, D.M.: On Children's Use of Conceptual Models in Reasoning About Current Electricity. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 73-82
G6;P;E

SHIPSTONE, D. : A Study of Children's Understanding of electricity in simple DC Circuits. European Journal of Science Education 6, 1984, 185-188
G6;P;E

SHIPSTONE, D.: Electricity in Simple Circuits. Driver, R., Guesne, E., Tiberghien, A.(ed.): Children's Ideas in Science, 1985, 33-51
G6;G7;P;E

SHIPSTONE, D. : A Study of Secondary School Pupils' Understanding of Current, Voltage and Resistance in Simple DC Circuits. School of Education, University of Nottingham, n.d.
G6;P;E

SOLOMON, J., BLACK, P., OLDHAM, V., STUART, H.: The Pupils' View of Electricity. European Journal of Science Education 7, 1985, 281-294
G6;P;E

SPRINGFELD, U.: Schülerinterpretation eines klassischen Experiments zur Elektrostatik. In: Wiebel, K.H.(Hrsg.): Zur Didaktik der Physik u. Chemie; Vorträge a. der Tagung für Didaktik der Physik/Chemie, Oldenburg 1986, 248-250
G6;P;E

STEINBERG, M.S.: Reinventing Electricity. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 388-401
G6;P;E

STORK, E., WIESNER, H.: Schülervorstellungen zur Elektrizitätslehre und Sachunterricht Sachunterricht und Mathematik in der Primarstufe 9, 1981, 218-230.
G6;G7;P;E

STORK, E., WIESNER, H.: Schülervorstellungen zur Elektrizitätslehre und Sachunterricht.. Bericht über einen Versuch zur Integration von fachdidaktischer Forschung und schulpraktischer Ausbildung an der Universität. In: Sachunterricht und Mathematik in der Primarstufe 9, 1981, 218-230
G6;G7;P;E

TASKER, R., OSBORNE, R.J.: Science Teaching and Science Learning. Osborne, R.J., Freyberg, P.: Learning in science. The implications of children's science, 1985, 15-27
G6;G7;P;E

TENNEY, Y., GENTNER, D.: What Makes Analogies Accessible: Experiments on the Water - Flow Analogy for Electricity. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 311-318
G6;P;E

TIBERGHIEN, A., DELACOTE, G.: Manipulation et representations de circuits electrique simples chez des enfants de 7 a 12 ans. In: Review Francaise de Pedagogie 34, 1976, 32-44
G6;P;E

TIBERGHIEN, A.: Critical Review on the Research aimed at elucidating the sense that the Notions of Electric Circuits have for Students aged 8 to 20 Years. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 109-123
G6;P;E

TOLLE-HERLYN, A.: Der mühsame Weg bis zur Ausbildung einer einfachen Stromkreisvorstellung. In: Mikelskis, H. (Hrsg): Zur Didaktik der Physik und Chemie. Vorträge der GDCP Tagung 1985. Alsbach: Leuchtturm, 1986, 218-222
G6;P;E

WILKINSON, D.: A Study of Some Concepts Involving Electricity. M.A.thesis, University of Leeds, 1973
G6;P;E

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

P	- Bereich der Physik	Area of physics
T	- Wärme	- heat

ACKERMANN, K., DINTER, K., JAECKEL, K.: Untersuchungen von Schülervorstellungen und Handlungsweisen im Bereich Wärmelehre. In: Mikelskis, H.(Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge der GDCP Tagung 1985. Alsbach: Leuchtturm, 1986, 203-205
G6;P;T

ALBERT, E.: Development of the Concept of Heat in Children. In: Science Education 62 (3), 1978, 389-399
G6;T;P

ANDERSSON, B.R.: Pupils' Understanding of Some Aspects of Energy Transfer. EKNA-project 1980. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1980
G6;P;M;E;T

ANDERSSON, B.R.: Some Aspects of Children's Understanding of Boiling Point. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 252-259
G6;T;P

ANDERSSON, B.R.: The experiental gestalt of causation: a common core to pupils preconceptions in science. European Journal of Science Education 2, 1986, 155-171
G1;G6;P;M;E;T;O

APPLETON, K.: Children's Ideas about Temperature. Research in Science Education 15, Australien Science Education Research Association, 1985, 122-126
G6;P;T

BEVERIDGE, M.: The Developement of young Childrens' Understanding of the Process of Evaporation. Britisch Journal of Educational Psychology 55, 1985, 84-90
G6;P;T

BRAND, K.-J., BRAUNER, R.: Auffassungen, Vorstellungen und Begriffe von Kindern im Zusammenhang mit Phänomenen der Wärmelehre. In: Naturwissenschaften im Unterricht - Physik/Chemie 26, 1978, 105-116
G6;T;P

BROOK, A., BRIGGS, H., BELL, B., DRIVER, R.: Aspects of Secondary Students' Understanding of Heat: Summary Report. CIS: Childrens' Learning in Science Project. Centre for Studies in Science and Mathematics Education. The University of Leeds, 1984
G6;P;T

BROOK, A., BRIGGS, H., BELL, B., DRIVER, R.: Aspects of Secondary Students' Understanding of Heat: Full Report. CIS: Childrens' Learning in Science Project. Centre for Studies in Science and Mathematics Education. The University of Leeds, 1984
G6;P;T

DUIT, R.: Wärmevorstellungen. In: Duit, R., Jung, W., Rhöneck, Ch.v. (Hrsg.): Alltagsvorstellungen. Naturwissenschaften im Unterricht Physik/Chemie 34, April 1986, 30-33
G6;P;T

ENGEL CLOUGH, E., DRIVER, R.: A Study of Consistency in the Use of Students' Conceptual Frameworks Across Different Task Contexts. Science Education 70 (4), 1986, 473-496
G6;P;M;T;B

ENGEL CLOUGH, E., DRIVER, R.: Secondary students' conceptions bringing together scientific and personal views. Physics Education 20, 1985, 175-182
G6;G7;P;T

ENGELHARDT, P., JUNG, W., WIESNER, H.: Welche Beziehungen sehen Studenten zwischen Begriffen aus der Mechanik bzw. Thermodynamik ? In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1975, 249-258
G5;G6;M;T;P

ERICKSON, G. : Children's Viewpoints of Heat: A Second Look. In: Science Education 64, 1980, 323-336
G6;P;T

ERICKSON, G., TIBERGHIEN, A.: Heat and Temperature. In: Driver, R., Guesne, E., Tiberghien, A. (ed.): Children's Ideas in Science
G6;G7;P;T

ERICKSON, G. : Children's Conceptions of Heat and Temperature. In: Science Education 63 (2), 1979, 221-230
G6;P;T

ERATUULI, M.: Wie können sich die finnischen Schüler der Schuljahre 7 bis 9 die alltäglichen Phänomene der Wärmelehre erklären. Research Report 17. Department of Teacher Education, University of Helsinki, 1984
G6;P;T

FINLEY, F.N.: Variations in Prior Knowledge. Science Education 69, 1985, 697-705
G6;P;T

GUESNE, E., TIBERGHIEN, A., DELACOTE, G.: Methods et resultats concernant l'analyse des conceptions des eleves dans differents domaines de la physique. Deux exemples: les notions de chaleur et lumiere. In: Revue Francaise de Pedagogie 45, 1978, 25-36
G6;P;T;O

GUESNE, E., MCDERMOTT, L.C.: Students' Conceptions and Learning in the Fields of Light and Heat. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 577-579
G6;P;T;O

HALL, G.S., BROWNE, C.E.: Children's ideas of fire, heat, frost and cold. Ped. Sem. 10, 1903, 27-85
G6;P;T

HEWSON, M.G., HAMLYN, D.: The Representation and Analysis of Conceptions of Heat. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 347-364
G6;P;T

HEWSON, M.G., HAMLYN, D.: The Influence of Intellectual Environment on Conceptions of Heat. European Journal of Science Education 6, 1984, 254-262
G2;G6;P;T

HEWSON, M.G.: The Role of Intellectual Environment in the Origin of Conceptions: an Explanatory Study. In: WEST, PINES (Ed.): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 153-161
G1;G4;G6;P;T;

HOLLON, R.E., ANDERSON, C.W.: The Curricular Significance of College Students' Conceptions of Heat and Temperature. Paper to be presented at the AERA meeting in Chicago, 1985
G6;P;T

JOHNSTONE, A.H., MCDONALD, J.J., WEBB, G.: Misconceptions in School Thermodynamics. In: Physics Education 12 (4), 1977, 248-251
G6;C;P;T

MANTHEI, U.: Zur genetischen Begriffsdifferenzierung und Begriffspräzisierung. Ergebnisse einer Untersuchung am Beispiel Wärme - Temperatur. In: Physik in der Schule 18 (9), 1980, 389-398
G6;P;T

MANTHEI, U., TÄUBERT, P.: Zustandsgröße und Prozeßgröße erläutert am Beispiel Energie - Arbeit, Wärme, Strahlung. In: Physik in der Schule 19 (7/8), 1981, 307-317
G6;P;M;T;EN

MAYER, M.: Understanding the functioning of simple domestic appliances in relation to scientific concepts. CEDE - Centro dell 'Educazione Villa Falconieri, Frascati, Working paper, n.d.
G6;P;EN;T

MOREIRA, M.A., SANTOS, C.A.: The Influence of Content Organization of Student's Cognitive Structure in Thermodynamics. Journal of Research in Science Teaching 18, 1981, 525-531
G5;G6;P;T

ROSENQUIST, M., POPP, B.D., MCDERMOTT, L.C.: Some Elementary Conceptual Difficulties with Heat and Temperature. Paper presented at the national meeting of the American Association of Physics Teachers in San Francisco, Jan. 27, 1982
G6;P;T

SHAYER, M., WYLAM, H.: The Development of the Concept of Heat and Temperature in 10-13 Year Olds. In: Journal of Research in Science Teaching 18 (5), 1981, 419-434
G6;P;T

STAVY, R., BERKOVITZ, B.: Cognitive Conflict as a Basis for Teaching Quantitative Aspect of the Concept of Temperature. In: Science Education 64 (5), 1980, 679-692
G6;G7;P;T

STAVY, R., STRAUSS, S.: Educational-Developmental Psychology and Curriculum Development: The Case Heat and Temperature. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 292-303
G6;G7;P;T

SWAN, M., JONES, O.E.: Comparison of Students' Percepts of Distance, Weight, Height, Area and Temperature. In: Science Education 64 (3), 1980, 297-307
G6;P;T;M

TIBERGHIEN, A., DELACOTE, G.: Conception de la chaleur les enfants de 10 a 12 ans. Proceedings of GIREP, Eds. Taylor and Francis, 1976
G6;P;T

TIBERGHIEN, A.: Modes and Conditions of Learning - an Example: The Learning of Some Aspects of the Concept of Heat. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 288-309
G6;P;T

TIBERGHIEN, A., BARBOUX, M.: Difficultes de l'aquisition de la notion de temperature par les eleves de 6ieme. 5 Journees Intenationales de Chamonix Fev. 1983
G6;P;T

TIBERGHIEN, A.: Critical Review on the Research Aimed at Elucidating the Sense That Notions of Temperature and Heat Have for the Students Aged 10 to 16 Years. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 75-90
G6;P;T

WIESNER, H., STENGL, D.: Vorstellungen von Schülern der Primarstufe zu Temperatur und Wärme. Sachunterricht und Mathematik in der Primarstufe 12, 1984, 445-452
G6;P;T

WIESNER, H.: Untersuchungen von Vorstellungen von Primarstufenschülern über Begriffe und Phänomene aus der Wärmelehre. In: MIKELSKIS, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie, 1984. Alsbach: Leuchtturm, 1985, 242-244
G6;G7;P;T

ZIMMERMANN, M.L.: Quelques Representations d'Eleves a propos de la Chaleur Actes des Journees Internationales sur l'Education Scientifique. Volume IV, 1982
G6;P;T

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

P - Bereich der Physik Area of physics
M - Mechanik - mechanics

AMEH, C., GUNSTONE, R.: Teachers' Concepts in Science. Research in Science Education 15, Australian Science Education Research Association, 1985, 151-157
G6;G8;P;M;E;B

AMEH, C., GUNSTONE, R.: Science Teachers' concepts in Nigeria and Australia. In: Research in Science Education 16, 1986, 73-81
G6;G8;P;E;M;B

ANDERSSON, B.R.: Pupils' Understanding of Some Aspects of Energy Transfer. EKNA-project 1980. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1980
G6;P;M;E;T

ANDERSSON, B.R.: The experiental gestalt of causation: a common core to pupils preconceptions in science. European Journal of Science Education 2, 1986, 155-171
G1;G6;P;M;E;T;O

ARCHENHOLD, F.: An Empirical Study of the Understanding by 16-19 Year Old Students of the Concepts of Work and Potential in Physics. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 228-238
G6;P;M

ARONS, A.B.: Thinking, Reasoning and Understanding in Introductory Physic Courses. The Physics Teacher, 1981, 166-172
G6;G7;P;M

BARBETTA, M.G., LORIA, A., MASCELLANI, V., MICHELINI, M.: An Investigation on Students' Frameworks About Motion and the Concepts of Force and Energy. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 219-226
G6;P;M;EN

BERGE, O.E., HAUKE, B.: Schüler äußern sich über Energie. In: Naturwissenschaften im Unterricht - Physik/Chemie 31, 1983, 352-355
G6;M;P;EN

CARAMAZZA A., MC CLOSKEY M., GREEN B.: Curvilinear Motion in the Absence of External Forces: naive Beliefs about the Motion of Objects Science, 1980, 1139-1141
G6;P;M

CARAMAZA, A., MCCLOSKEY, M., GREEN, B.: Naive Beliefs in "Sophisticated" Subjects: Misconceptions About Trajectories of Objects. In: Cognition 9 (2), 1981, 117-123
G6;M;P

CASTLE, F.: Problem Solving in Mechanics. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 319-328
G6;P;M

CHAMPAGNE, A.B., GUNSTONE, R., KLOPFER, L.E. Effecting Changes in Cognitive Structure among Physics Students. In: WEST, PINES (Ed): Cognitive Structure and Conceptual Change. Orlando etc: Academic Press, 1985, 163-187
G1;G5;G6;G7;P;M

CHAMPAGNE, A.B., GUNSTONE, R. , WHITE, R.T.: Knowledge of Basic Principles of Dynamics. Working Paper. Faculty of Education, Monash University, Melbourne, 1979
G1;G6;M;P

CHAMPAGNE, A.B., HALBWACHS, F., MEHEUT, M.: Representations and Their Role in Learning in the Fields of Mechanics and Transformations of Matter. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 629-634
G6;C;P;M;AT

CHAMPAGNE, A.B., KLOPFER, L.E., SOLOMON, C.A., CAHN, A.D.: Interactions of Students' Knowledge With Their Comprehension and Design of Science Experiments. (ERIC No.ED188950) Learning Research and Development Center, University of Pittsburgh, 1980
G6;M;P

CHAMPAGNE, A.B., KLOPFER, L.E., ANDERSON, J.: Factors Influencing the Learning of Classical Mechanics. In: American Journal of Physics 48, 1980, 1074-1079
G1;G6;G7;M;P

CHAMPAGNE, A.B., KLOPFER, L.E., GUNSTONE, R. : Student Beliefs About Gravity and Motion. Problem Solving, 1981, 3, 12-14
G6;M;P

CLEMENT, J.: Cataloque of Students' Conceptual Models in Physics. Section 1: Movement and Forces. Department of Physics and Astronomy, University of Massachusetts, Amherst, Mass. Working Paper, November 1977
G6;M;P

CLEMENT, J.: Cataloque of Spontaneous Analogies Generated by Students Solving Physics Problems. Department of Physics and Astronomy, University of Massachusetts, Amherst, Mass. Working Paper, June 1978
G6;P;M

CLEMENT, J.: Students' Preconceptions in Introductory Mechanics. In: American Journal of Physics 50 (1), 1982, 66-71
G6;M;P

CLEMENT, J.: Students' Alternative Conceptions in Mechanics: A Coherent System of Preconceptions? In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 310-315
G6;P;M

CLEMENT, J.: A Conceptual Model Discussed by Galileo and Used Intuitively by Physics Students In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey, London: Lawrence Erlbaum, 1983, 325-339
G3;G6;P;M

CLEMENT, J: Student Responses to a Problem on Newton's First and Second Laws. Department of Physics and Astronomy University of Massachusetts, Amherst, Mass. Working Paper, n.d.
G6;P;M

COLE, H., RAVEN, R.: Principle Learning as a Function of Instruction on Excluding Irrelevant Variables. In: Journal of Research in Science Teaching 6, 1969, 234-241
G6;M;P

COSGROVE, M., OSBORNE, R.J.: Physical Change. Working Paper 210. Learning in Science Project. University of Waikato, 1985, 28-57
G5;G6;P;M

DAHNCKE, H.: Teilaspekte der Energieerhaltung. Eine empirische Untersuchung einiger Voraussetzungen für Unterricht über das Prinzip von der Erhaltung der Energie bei 10 bis 16jährigen Kindern. Dissertation, Kiel, 1972
G6;P;M;EN

DAHNCKE, H., DUIT, R., NIEDDERER, H.: A Hierarchy of Concepts and Principles. Some Types of Learning and Some Resultats Concerning the Concept of Energy for 6th Graders in the IPN Curriculum Physik. In: FREY, K., LANG, M. (Hrsg.): Kognitionspsychologie und naturwissenschaftlicher Unterricht. Bern: Huber, 1973, 341-365
G6;P;M;EN

DAHNCKE, H., WESTPHAL, W.: Methoden und Ergebnisse einer Untersuchung über Unterrichtsvoraus setzungen zum Prinzip von der Erhaltung der Energie. In: SCHMIDT, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Probleme und Perspektiven. Hannover: Schroedel, 1973, 105-116
G6;P;M;EN

DAHNCKE, H., DUIT, R., RHÖNECK, C. v.: Methoden und Zwecke verschiedener Untersuchungen zur Erfassung der Vorstellungen von Schülern - Die Bew. einer Kugel in gebogenen Bahnen. In: DUIT, R., JUNG, W., PFUNDT, H. (Hrsg.): Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1981, 241-260
G5;G6;P;M

DENTICI, O.A., GROSSI, M.C., BORGHI, L., DE AMBROSIS, A., MASSARA, C.I.: Understanding Floating: a Study of Children aged between six and eight years. European Journal of Science Education 6, 1984, 235-243
G6;P;M

DI SESSA, A.A.: Unlearning Aristotelian Physics: a Study of Knowledge based Learning. Cognitive Science 6, 1982, 37-75
G6;P;M

DI SESSA, A.A.: Phenomenology and the Evolution of Intuition. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey, London: Lawrence Erlbaum, 1983, 15-33
G1;G6;P;E;M

DIBAR URE, C.M.: A Study of Brazilian University Freshman Answers to a Problem in Mechanics. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 234-239
G6;P;M

DRIVER, R.: The Representation of Conceptual Frameworks in Young Adolescent Science Students. Ph.D.thesis, University of Illinois, Urbana ,Illinois, 1973
G6;M;P

DRIVER, R.: Cognitive Psychology and Pupils' Frameworks in Mechanics. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 171-198
G1;G6;P;M

DUIT, R., ZELEWSKI, H.D. V.: Ohne Energie ist es düster in unserem Leben. In: Naturwissenschaften im Unterricht - Physik/Chemie 27, 1979 161-164
G6;P;M;EN

DUIT, R.: Understanding Energy as a Conserved Quantity - Remarks on the Article by R.U. Sexl. In: European Journal of Science Education 3, 1981, 291-301
G6;P;M;EN

DUIT, R.: Students' Notions About the Energy Concept - Before and After Physics Instruction. In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 266-319
G6;P;M;EN

DUIT, R.: Erlernen physikalischer Begriffe im Physikunterricht - ein zu hoher Anspruch für die Sekundarstufe I? In: Der mathematische und naturwissenschaftliche Unterricht 35, 1982, 283-290
G6;P;M

DUIT, R.: Vom Wort der Alltagssprache zum Fachterminus. Eine empirische Untersuchung zum Erlernen physikalischer Begriffe in der S I. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1982. Gießen: I. Physikalisches Institut, 1982
G4;G6;M;P

DUIT, R.: Änderungen von Alltagsvorstellungen durch Physikunterricht ? GDCP-Tagung, September 1982, Würzburg
G6;P;M

DUIT, R.: Kraft, Arbeit, Leistung, Energie - Wörter der Alltagssprache und der physikalischen Fachsprache. In: physica didactica 11, 1984, 129-144

G4;G6;P;M;EN

DUIT, R.: Work, Force and Power - Words in Everyday Language and Terms in Mechanics. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 227-233

G4;G6;P;M;EN

DUPRE, F., NOCE, G., VICENTINI-MISSONI, M.: Die Gestalt der Erde und die Schwerkraft: Common-Sense Wissen von Erwachsenen. In: physica didactica 11, 1984, 3-21

G6;P;M;AS

ENGEL CLOUGH, E., DRIVER, R.: A Study of Consistency in the Use of Students' Conceptual Frameworks Across Different Task Contexts. Science Education 70 (4), 1986, 473-496

G6;P;M;T;B

ENGEL, E.: Investigating Pupils' Understanding of Aspects of Pressure. In: Proceedings of the International Workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 214-133

G6;P;M

ENGELHARDT, P., JUNG, W., WIESNER, H.: Welche Beziehungen sehen Studenten zwischen Begriffen aus der Mechanik bzw. Thermodynamik ? In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1975, 249-258

G5;G6;M;T;P

EYLON, B., SINGER, J., GANIEL, U.: Problem Solving in High School - A Necessary Addition to the Physics Curriculum. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 312-318

G6;P;M

FAUCHER, G.: Advanced Physics Cources Do Not Provide Students With Conceptual Change. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 322-327

G6;P;E;M;MAG

FLESHNER, E.A.: Psychology of the Mastery and Application by Schoolchildren of Some Concepts in Physics. Printed in the Symposium Psychology of Applying Knowledge in School Work, ed. N.A. Menchinskaia, Moscow, 1958, 77-129

G6;P;M

FLESHNER, E.A.: The Mastery by Children of Some Concepts in Physics. In: SIMON, B., SIMON, J.: Educational Psychology in the U.S.S.R. Routledge & Kegan Paul, 1963, 202-212

G6;P;M

FUSCHINI, E., GRIMELLINI TOMASINI, N., PECORI BALANDI, B.: Students' Frameworks in Mechanics: A Study of Freshman. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 240-247

G6;P;M

GENNARO, E.D.: Assessing Junior High Students' Understanding of Density and Solubility. In: School Science and Mathematics 81, 1981, 399-404

G6;C;P;M

GILBERT, J.K., OSBORNE, R.J.: 'I understand, but I don't get it': Some Problems of Learning Science. In: The School Science Review 61, 1979/80, 664-674

G6;P;M

GILBERT, J.K., WATTS, M., OSBORNE, R.J.: Students Conceptions of Ideas in Mechanics. In: Physics Education 17 (2), 1982, 62-66

G6;P;M

GILBERT, J.K., ZYBERSTAJN, A.: A Conceptional Framework for Science Education: The Case Study of Force and Movement European Journal of Science Education 7, 1985, 107-120

G6;P;M

GORODETSKY, M., HOZ, R.: The Effects of Misconceptions of Speed and Time on the Solution of Speed Problems. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 346-355

G6;P;M

GUNSTONE, R. , WHITE, R.T.: Understanding of Gravity. Science Education 65, 1981, 291-299

G6;P;M

GUNSTONE, R., WATTS, M.: Force and Motion. In: Driver, R., Guesne, E., Tiberghien, A. (ed.): Children's Ideas in Science

G6;G7;P;M

HALLOUN, J.A., HESTENES, D.: Common Sense Concepts about Motion. American Journal of Physics 53, 1985, 1056-1065

G6;P;M

HEIDENREICH, R., JAECKEL, K.: Untersuchung von Problemlösungsstrategien von Jugendlichen im physikalischen Bereich In: Mikelskis, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge der GDCP Tagung 1985. Alsbach: Leuchtturm, 1986, 175-177

G6;P;M

HEWSON, M.G., HEWSON, P.W.: Effect of Instruction Using Students' Prior Knowledge and Conceptual Change Strategies in Science Learning. In: Journal of Research in Science Teaching 20 (8), 1983, 731-743

G6;G7;P;M

HEWSON, M.G.: The Acquisition of Scientific Knowledge: Analysis and Representation of Student Conceptions Concerning Density. Science Education 70(2), 1986, 159-170

G1;G6;P;M

HOJNACKI, S.K., RESNICK, L.B.: Coherence and Consistency in Naive Physics Reasoning. Paper presented at the Annual Meeting of the American Educational Research Association, Washington, D.C., April 1987

G6;P;M

JENELTEN-ALLKOFER, C., DUIT, R.: Entwicklung des Energiebegriffs bei 5- bis 16-Jährigen. In: Naturwissenschaften im Unterricht - Physik/Chemie 12, 1980, 405-413

G6;P;M;EN

JOHNSON, P.E., CURRAN, T.E., COX, D.L.: A Model for Knowledge of Concepts in Science. In: Journal of Research in Science Teaching 8, 1971, 91-95

G6;P;M

JUNG, W., SCHWEDES, H.: Lernschwierigkeiten im Physikunterricht. In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1975, 82-90

G1;G6;P;M

JUNG, W., REUL, H., SCHWEDES, H.: Untersuchungen zur Einführung in die Mechanik in den Klassen 3-6. Frankfurt/Main: Diesterweg, 1977

G1;G6;G7;P;M

JUNG, W.: Zum Problem der "Schülervorstellungen". In: physica didactica 5 (3), 1978, 125-146, physica didactica 5 (4), 1978, 231-248

G1;G5;G6;P;M

JUNG, W., WIESNER, H.: Zur Definition fachdidaktischer Probleme am Beispiel der Mechanik. In: physica didactica 6, 1979, 203-216

G6;G7;P;M

JUNG, W.: Schülervorstellungen in Mechanik. In: HÄRTEL, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1979, 74-76
G1;G6;P;M
JUNG, W.: Schülervorstellungen in Physik. Einige Ergebnisse, Deutungen und Schlußfolgerungen. In: Naturwissenschaften im Unterricht - Physik/Chemie 27, 1979, 39-46
G6;P;M
JUNG, W., WIESNER, H.: Wie wenden Schüler Physik an zur Erklärung alltäglicher Erscheinungen? Untersuchungen am Beispiel der klassischen Mechanik. In: physica didactica 7, 1980, 147-164
G6;P;M
JUNG, W., WIESNER, H., ENGELHARDT, P.: Vorstellungen von Schülern über Begriffe der Newtonschen Mechanik. Bad Salzdethfurt: Didaktischer Dienst Franzbecker, 1981
G1;G6;P;M
JUNG, W., WIESNER, H.: Verständnisschwierigkeiten beim physikalischen Kraftbegriff. Eine Untersuchung zum Kraftbegriff bei Physikstudenten. In: Physik und Didaktik 9 (2), 1981, 111-122
G6;P;M
JUNG, W.: Sprache und Physiklernen. Zur Beschreibung von Bewegung. In: Naturwissenschaften im Unterricht - Physik/Chemie 31 (10), 1983, 335-339
G5;G6;P;M
KASS, H., LAMBERT, P.: Student Preconceptions in Introductory High School Physics as Related to Course Achievement. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 374-387
G6;P;M
KIRCHER, E., WIDL, M.: Eine empirische Untersuchung zu Piagets Hypothese über die Entwicklung physikalischer Invarianzbegriffe. physica didactica 13, Heft 2/3, 1986, 13-16
G6;P;M
KOLIOPOULOS, D., KARIOTOGLOU, P., PSILLOS, D.: La force dans le contexte des liquides; une premiere approche des con ceptions des eleves sur la statique des liquides en college en grece In: Giordan, A., Martinand, J.-L. (Hrsg.): Feuilles d'epistemologie appliquee et de didactique des sciences 8, 1986, 59-65
G6;P;M
KOVACS, L.: How Pupils Think on Some Mechanical Concepts. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 215-218
G6;P;M
KUBLI, F.: Piagets Methode zur Untersuchung kognitiver Entwicklungsstufen im Physikunterricht. In: Naturwissenschaften im Unterricht - Physik/Chemie 27, 1979, 74-78
G6;P;M
LARKIN, J.: Cognition of learning physics. American Journal of Physics 49, 1981, 534-541
G1;G6;P;M
LARKIN, J. : The Role of Problem Representation in Physics. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey London: Lawrence Erlbaum, 1983, 75-98
G1;G6;P;M
LEBOUTET-BARREL, L.: Concepts of Mechanics Among Young People. In: Physics Education 11, 1976, 462-466
G6;P;M

LEBOUTET-BARRELL, L.: Mechanische Begriffe von Jugendlichen. physica didactica 5, 1978, 55-62
G6;P;M

LIE, S., SJOBERG, S., EKELAND, P., ENGE, M.: Ideas in Mechanics. A Norwegian Study. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 255-277
G6;P;M

LOVELL, K.: Understanding of Scientific Concepts at Different Developmental Levels and a Technique for Investigating the Degree of Under standing. Illustrated by Reference to Electrostatic and Gravitational Potential. n.d.
G6;P;E;M

LYBECK, L.: Research into Science and Mathematics Education at Göteborg. Department of Education and Educational Research. Gothenburg University. Report no. 1985: 03, 1985
G1;G6;P;M

LÖFFLER, G.: Sources of Misconceptions. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 284-289
G6;P;M

MALONY, D.P.: Rule-Governed Physics: Some Novice Predictions. European Journal of Science Education 7, 1985, 295-306
G6;P;M

MANTHEI, U., TÄUBERT, P.: Zustandsgröße und Prozeßgröße erläutert am Beispiel Energie - Arbeit, Wärme, Strahlung. In: Physik in der Schule 19 (7/8), 1981, 307-317
G6;P;M;T;EN

MCCLELLAND, J.A.G.: An Approach to the Development and Assessment of Instruction in Science at Second Grade Level, the Concept of Energy. Thesis, Cornell University, Ithaca, N.Y., 1970
G6;P;M;EN

MCCLELLAND, J.A.G.: Earthly Mechanics: Two Misapprehensions and a Heresy. In: Physics Education 10, 1975, 28-29
G6;P;M

MCCLELLAND, J.A.G.: Misconceptions in mechanics and how to avoid them. Physics Education 20, 1985, 159-162
G6;P;M

MCCLOSKEY, M., KOHL, D.: Naive physics: the curvilinear impetus principle and its role in interactions with moving objects. Journal of Experimental Psychology 9, 1983, 146-156
G6;P;M

MCCLOSKEY, M.: Naive Theories of Motion. In: GENTNER, STEVENS (Ed.): Mental Models. Hillsdale/New Jersey, London: Lawrence Erlbaum, 1983, 299-324
G3;G6;P;M

MCCLOSKEY, M.: Intuitive Physics. In: Scientific American 248 (4), 1983, 114-122
G6;P;M

MCDERMOTT, L.C.: Critical Review of Research in the Domain of Mechanics. In: Research on Physics Education. Proceedings of the first inter national workshop. La Londe les Maures, 1983, 139-182
G6;P;M

MCDERMOTT, L.C.: Research on Conceptual Understanding in Mechanics. In: Physics Today, July 1984, 24-32
G6;P;M

MORI, I., KOJIMA, M., TADANG, N.: The effect of language on a child's conception of Speed: a Comparative Study on Japanese and Thai Children. Science Education 60, 1976, 531-534
G4;G6;P;M

MURRAY, D.L.: Misconceptions of Osmosis. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 428-433
G6;B;P;M

NACHTIGALL, D.: The Pre-Newtonian Concept of Motion in the Minds of Students. Paper presented at the Conference on Methods of Teaching Physics, 11. - 13. November 1981, Khom Kaen University, Thailand
G6;P;M

NACHTIGALL, D.: Vorstellungen von Fünftklässlern über den freien Fall. In: Naturwissenschaften im Unterricht - Physik/Chemie 30 (3), 1982, 91-97
G6;P;M

NACHTIGALL, D.: Misconceptions in Physics and a Strategy to overcome them. In: The many faces of teaching and learning mechanics ... Proceedings of a conference on physics education, Utrecht. The Netherlands, Aug. 1984
G6;G7;P;M

NACHTIGALL, D.: Vorstellungen im Bereich der Mechanik. In: Duit, R., Jung, W., Rhöneck, Ch.v.(Hrsg.): Alltagsvorstellungen. Naturwissenschaften im Unterricht Physik/Chemie, 1985, 16-20
G6;P;M

NARODE, R.: Catalogue of Misconceptions from Introductory Mechanics: A Personal Account. Department of Physics and Astronomy. University of Massachusetts. Amherst, Mass.
G6;P;M

NIELSEN, H., THOMSEN, P.V.: Part og Kraft. Det fysiske Institut. Aarhus Universitet, 1982
G6;P;M

NIELSEN, H., THOMSEN, P.: Ideas About Force and Movement Among Danish University Students and Candidates. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 248-254
G6;P;M

NOCE, G., VICENTINI-MISSONI, M.: Investigations on the Common Sense Knowledge of Adults: Gravity and Light. (not published)
G6;P;M;O

NOVAK, J.D.: Editorial Comments on "Development of Earth and Gravity Concepts Among Nepali Children". In: Science Education 63 (5), 1979, 719-720
G6;P;M;AS

OGAR, J.: Ideas about physical phenomena in spaceships among students and pupils GIREP Conference 1986 - COSMOS - an Educational Challenge; Proceedings. Copenhagen, Denmark 1986, 375-378
G6;P;M;AS

OGBORN, J.: Understanding Students' Understanding. European Journal of Science Education 7, 1985, 141-150
G1;G6;P;M

OSBORNE, R.J., GILBERT, J.K.: A Technique for Exploring Student's Views of the World. In: Physics Education 15, 1980, 376-379
G6;P;M

OSBORNE, R.J., COSGROVE, M.: Children's Conceptions of the Changes of State of Water. In: Journal of Research in Science Teaching 20 (9), 1983, 825-838
G6;P;M

OSBORNE, R.J.: Building on children's intuitive ideas. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science, 1985, 41-50
G6;G7;P;M

PETERS, P.C.: Even honors Students have Conceptual Difficulties with Physics. American Journal of Physics 50, 1982, 501-508
G6;P;E;M

PIAGET, J., DE LANNOY, J.: La formation de la notion de force. Kap.V, La transmission de l'energie entre deux pendules relies par un fil. Presses Universitaires, Paris, 1973
G6;P;M;EN

PIAGET, J., SZEMINSKA, A.: La formation de la notion de force. Kap.III, Le probleme de la remontee d'une bille apres une descente. Presses Universitaire, Paris, 1973
G6;P;M

PREECE, P.F.W.: Development Trends in the Continued Word Associations of Physics Students. In: Journal of Research in Science Teaching 14, 1977, 235-239
G6;P;M

RAPOPORT, A.: Newtons Physik und die Flugschüler. In: HAYAKAWA, S. (Hrsg.): Wort und Wirklichkeit. Darmstadt: Verlag Darmstädter Blätter, o.Jg., 123-146
G4;G6;P;M

RAVEN, R.J.: The Development of the Concept of Acceleration in Elementary School Children. In: Journal of Research in Science Teaching 9, 1972, 201-206
G6;P;M

RHÖNECK, C. V.: Lernschwierigkeiten beim Energieerhaltungssatz der Mechanik im Zusammenhang mit Reibungsphänomenen. In: physica didactica 6, 1979, 221-227
G6;P;M;EN

RHÖNECK, C. V.: Der Geschwindigkeitsbegriff von Fünftklässlern und didaktische Hilfen auf dem Weg zu v=s/t. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1983. Gießen: 1.Physikalisches Institut, 1983, 232-237
G6;P;M

ROWELL, J.A., DAWSON, C.J.: Teaching About Floating and Sinking: An Attempt to Link Cognitive Psychology With Classroom Practice. In: Science Education 61 (4), 1977, 243-251
G6;P;M

ROWELL, J.A., DAWSON, C.J.: Teaching About Floating and Sinking: Further Studies Toward Closing the Gap Between Cognitive Psychology and Classroom Practice. In: Science Education 61 (4), 1977, 527-540
G6;P;M

RUGGIERO, S., CARTELLI, A., DUPRE, F., VICENTINI-MISSONI, M.: Gravity and Air Pressure. Mental representation schemes in middle school children. unpublished paper, n.d.
G6;P;M

RUGGIERO, S., CARTELLI, A., DUPRE, F., VICENTINI-MISSONI, M.: Weight, Gravity and Air Pressure: Mental Representations by Italian Middle School Pupils. European Journal of Science Education 7, 1985, 181-194
G6;P;M

SALTIEL, E.: Kinematic Concepts and Natural Reasoning: Study of Comprehension of Galilean Frames by Science Students. Doctoral Thesis, Department of Physics, University of Paris VII, France, 1978. In: European Journal of Science Education 3 (1), 1981, 110
G6;P;M

SALYACHIVIN, S., SCHÖNHERR, J., SHANKAR, N.: Students' Conceptions on Force. Journal of Science and Mathematics Education in S.E. Asia 13, No. 1, 1985, 28-31
G6;P;M

SCHECKER, H.: Das Schülerverständnis zur Mechanik. Dissertation, Universität Bremen, 1985
G1;G6;P;M

SCHECKER, H.: Das Verständnis zentraler Begriffe der klassischen Mechanik bei Schülern der 11. Jahrgangsstufe. Forschungsprojekt "Wissenschaftstheorie im Physikunterricht", Universität Bremen, 1984
G6;P;M

SCHECKER, H: Eigenständige Schülerprozesse in Mechanik (S II). In: KUHN, W. (Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1984. Gießen: DPG-Fachausschuß Didaktik der Physik, 1984, 179-184
G6;P;M

SCHECKER, H., NIEDDERER, H.: Das Vorverständnis von S-II-Schülern zur Mechanik. In: Mikelskis, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge der GDCP Tagung 1985. Alsbach: Leuchtturm, 1986, 181-185
G6;P;M

SCHECKER, H.: Schülerinteressen und Schülervorstellungen zur Mechanik (S II). physica didactica 13, Heft 2/3, 1986, 21-33
G6;P;M

SCHENK, B.: Entwicklung von Schülertheorien zur Mechanik in der Sekundarstufe II. In: physica didactica 11, 1984, 113-125
G6;P;M

SCHÄFER, K.: Zur Bedeutung von Schülervorstellungen für den Physikunterricht. Schriften des Deutschen Vereins zur Förderung des mathematischen und naturwissenschaftlichen Unterrichts, Heft 33, 1985, 7-17
G1;G6;P;M

SEARLE, P.: Circular Motion Concepts of First Year Engeneering Students. Research in Science Education 15, Australian Science Education Research Association, 1985, 140-150
G6;P;M

SEGRE, G., GAGLIARDI, M.: Models, Paradigms and Misconceptions in Transport Processes. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 277-283
G6;P;M

SERE, M.G.: A Study of some Frameworks used by Pupils aged 11 to 13 years in the interpretation of Air Pressure. In: European Journal of Science Education, 1982, 299-309
G6;P;M

SERE, M.G.: A Study of Some Frameworks Used by Pupils Aged 11 to 13 Years in the Interpretation of Air Pressure. In: European Journal of Science Education 4 (3), 1982, 299-309
G6;P;M

SERE, M.G.: The Gaseous State. Driver, R., Guesne, E., Tiberghien, A.(ed.): Children's Ideas in Science, 1985, 104-123
G6;G7;P;M

SHEPHERD, D.L., RENNER, J.W.: Student Understandings and Misunderstandings of States of Matter and Density Changes. In: School Science and Mathematics 82 (8), 1982, 650-665
G6;P;M

SJOBERG, S., LIE, S.: Ideas About Force and Movement Among Norwegian Pupils and Students. Report 81-11. Centre for School Science, University of Oslo
G6;P;M

SNEIDER, C., PULOS, S.: Children's Cosmographies: Understanding the Earth's Shape and Gravity. In: Science Education 67 (2), 1983, 205-221
G6;P;M;AS

SOLOMON, J.: Background Ideas About Energy. Working Paper, Centre for Science Education, Chelsea College, Bridge Place, London SW6
G6;P;M;EN

SOLOMON, J.: How Children Learn About Energy or Does the First Law Come First? In: The School Science Review 63 (224), 1982, 415-422
G6;G7;P;M;EN

SOLOMON, J.: Learning About Energy: How Pupils Think in Two Domains. In: European Journal of Science Education 5 (1), 1983, 49-59
G6;G7;P;M;EN

STAVY, R., STACHEL, D.: Children's ideas about "solid" and "liquid" European Journal of Science Education 7, 1985, 407-421
G6;P;M

STEPANS, J.I., BEISWENGER, R.E., DYCHE, S.: Misconceptions die hard. The Science Teacher, September 1986, 65-69
G6;P;M

SUJAK-LESZ, K.: Physikalisches Denken von Schülern in der Grundstufe des systematischen Physikunterrichts. physica didactica 13, Heft 2/3, 1986, 17-20
G6;P;M

SWAN, M., JONES, O.E.: Comparison of Students' Percepts of Distance, Weight, Height, Area and Temperature. In: Science Education 64 (3), 1980, 297-307
G6;P;T;M

TERRY, C., JONES, G., HURFORD, W.: Children's conceptual understanding of forces and equilibrium. Physics Education 20, 1985, 162-165
G6;P;M

TERRY, C., JONES, G.: Alternative frameworks: Newton's third law and conceptual change. European Journal of Science Education, Vol.8, No.3, 1986, 291-298
G6;G7;P;M

TROWBRIDGE, D.E., MCDERMOTT, L.C.: Investigation of Student Understanding of the Concept of Acceleration in one Dimension. American Journal of Physics, 1981, 242-253
G6;P;M

VAN DEN BERG, J., RAAT, J.: Problem Solving in Mechanics - An Experiment in Mechanics Teaching. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 329-335
G6;G7;P;M

VESTING, P.: Concept Development in Pupils. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 290-302
G6;P;M

VIENNOT, L.: Sens Physique et Raisonnement Formel in Dynamique Elementaire. In: Encart Pedagogique 2, 1974, 35-46
G6;P;M

VIENNOT, L.: Mouvement et Force chez les etudiants de premier cycle universitaire. Le Pendule Simple. In: Bulletin de la Societe Francaise de Physique. Encart Pedagogique 2, 1974, 35-46
G6;P;M

VIENNOT, L.: Le raisonnement spontane en dynamique elementaire. In: Revue Francaise de Pedagogie 45, 1978, 16-24
G6;P;M

VIENNOT, L.: Le raisonnement spontane en dynamique elementaire. Paris: Hermann, 1979
G6;P;M

VIENNOT, L.: Spontaneous Reasoning in Elementary Dynamics. In: European Journal of Science Education 1 (2), 1979, 205-221
G6;P;M

VIENNOT, L.: Spontaneous Reasoning in Elementary Dynamics. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 273-274
G6;P;M

VIENNOT, L.: Natural Tendencies in Analysing Students' Reasoning Two Instances in Mechanics. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 239-244
G1;G6;P;M

VIENNOT, L.: Analysing Students' Reasoning in Science: A Pragmatic View of Theoretical Problems. European Journal of Science Education 7, 1985, 151-162
G1;G6;P;M

VIENNOT, L.: Analyzing Students' Reasoning: Tendencies in Interpretation. American Journal of Physics 53, 1985, 432-436
G6;P;M

VOORDE, H.H. TEN.: Education Based on a New Concept of Teaching. Paper represented at the "Cognitive Development-Research Seminar, Science and Mathematics Education", Leeds, September 1979
G6;P;M

WARREN, J.W.: Understanding Force. London: Murray, 1979
G6;P;M

WATTS, M.: An Exploration of Student's Understanding of the Concepts "Force" and "Energy". Paper represented at the International Conference on Education for Physics Teaching. Trieste, 1980
G6;P;M;EN

WATTS, M., ZYLBERSZTAJN, A.: A Survey of Some Children's Ideas About Force. In: Physics Education 16, 1981, 360-365
G6;P;M

WATTS, M.: Gravity - Don't Take it for Granted! In: Physics Education 17, 1982, 116-121
G6;P;M

WATTS, M.: A Study of Schoolchildren's Alternative Frameworks of the Concept of Force. In: European Journal of Science Education 5 (2), 1983, 217-230
G6;P;M

WATTS, M. .: Using Networks to Represent Pupils' Meanings for Concepts of Force and Energy. In: BLISS, J., MONK, M., OGBORN, J. (Eds.): Qualitative Data Analysis for Educational Research. London, Canberra: Croom Helm, 1983, 89-96
G6;P;M;EN

WEERDA, J.: Zur Entwicklung des Gasbegriffs beim Kinde. In: Naturwissenschaften im Unterricht - Physik/Chemie 29 (3), 1981, 90-98
G6;P;M

WHITAKER, R.J.: An Examination of Student Inconsistencies in Their Understanding of Trajectory Motion. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 402-406
G6;P;M

WHITAKER, R.J.: Aristotle is Not Dead: Student Understanding of Trajectory Motion. In: American Journal of Physics 51 (4), 1983, 352-357
G6;P;M

WHITE, B.: Sources of Difficulty in Understanding Newtonian Dynamics. Cognitive Science 7, 1983, 41-65
G6;P;M

WILKENING, F.: Integrating Velocity, Time, and Distance Information: A Developmental Study. In: Cognitive Psychology, in press
G6;P;M

ZEYER, G.: Vorstellungen von Erwachsenen zum freien Fall. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1981. Gießen: 1.Physikalisches Institut, 1981
G6;P;M

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

P - Bereich der Physik	Area of physics
O - Optik	- optics

ANDERSON, C.W., SMITH, E.L.:Children's Conceptions of Light and Color: Understanding the concept of unseen rays. Institute for Research on Teaching, Michigan State University, East Lansing, 1983
G6;G7;P;O

ANDERSON, C.W., SMITH, E.L. : Children's preconceptions and content-area textbooks. Duffy, G.G., Roehler, L.R., Mason, J.(Ed.): Comprehension instruction: Perspectives and suggestions, 187-201, New York, Longman,Inc., 1984
G6;G7;P;O;B

ANDERSSON, B.R., KÄRRQVIST, C.: Light and its Properties. The Pupil's Perspective, EKNA-report No.8. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1982
G6;O;P

ANDERSSON, B.R., KÄRRQVIST, C.: How Swedish Pupils, Aged 12-15 Years, Understand Light and Its Properties. In: European Journal of Science Education 5 (4), 1983, 387-402
G6;P;O

ANDERSSON, B.R.: The experiental gestalt of causation: a common core to pupils preconceptions in science. European Journal of Science Education 2, 1986, 155-171
G1;G6;P;M;E;T;O

BARTH, M.: Von der Schwierigkeit, optische Phänomene sinnvoll zu beschreiben. Bleichroth, W.(Hrsg.): Aufsätze zur Didaktik der Physik. physica didactica 13, Sonderheft, 1986, 81-86
G6;P;O

BLUMOR, R., HEISL, W., JUNG, W., WIESNER, H.: Schülervorstellungen und Lernprozesse im Bereich der Optik. In: Wiebel, K.H.(Hrsg): Zur Didaktik d. Physik u. Chemie; Vorträge auf der Tagung für Didaktik der Physik/Chemie, Oldenburg 1986, 226-228
G6;P;O

CLAUS, J., STORK, E., WIESNER, H.: Optik im Sachunterricht. Eine empirische Untersuchung zu Vorstellungen und Lernprozessen. Sachunterricht und Mathematik in der Primarstufe 10, 1982, 82-92
G6;G7;P;O

EATON, J.F., ANDERSON, C.W., SMITH, E.L.: Students' Misconceptions Interfere with Science Learning: Case Studies of Fifth-Grade Students. The Elementary School Journal, Vol. 84, No. 4, 365-379, The University of Chicago 1984
G6;G7;P;O

FEHER, E., RICE, K.: Development of Scientific Concepts through the Use of Interactive Exhibits in a Museum. American Museum of Natural History, 1985, 35-46
G5;G6;P;O

GILBERT, J.K., WATTS, M.: Concepts, Misconceptions and alternative Conceptions: changing perspectives in Science Education. Studies in Science Education 10, 1983, 61-98
G1;G6;P;E;EN;O;AT;T;C;B

GOLDBERG, F.M., MCDERMOTT, L.C.: Student difficulties in understanding image formation by a plane mirror. The Physics Teacher 24, 8, 1986, 472-480
G6;G7;P;O

GOLDBERG, F.M., MCDERMOTT, L.C.: An investigation of student understanding of the real image formed by a converging lens or concave mirror. American Journal of Physics 55, 2, 1987, 108-119
G6;P;O

GUESNE, E., MCDERMOTT, L.C.: Students' Conceptions and Learning in the Fields of Light and Heat. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 577-579
G6;P;T;O

GUESNE, E., TIBERGHIEN, A., DELACOTE, G.: Methode et resultats concernant l'analyse des conceptions des eleves dans differents domaines de la physique. Deux exemples: les notions de chaleur et lumiere. In: Revue Francaise de Pedagogie 45, 1978, 25-36
G6;P;T;O

GUESNE, E.: Lumiere et vision des objects: un exemple de representations des phenomenes physique preexistant a l'enseignement. Proceedings of GIREP, Eds. Taylor and Francis, 1976
G6;P;O

GUESNE, E.: Die Vorstellung von Kindern über Licht. In: physica didactica 11, 1984, 79-98
G6;P;O

GUESNE, E.: Light. In: Children's ideas in science. Milton Keynes, Philadelphia: Open University Press, 1985,10-33
G6;G7;P;O

HOFFMANN, K., WIESNER, H.: Lassen sich Alltagsvorstellungen über optische Phänomene durch Unterricht wirksam korrigieren? In: physica didactica 9, 1982, 299-317
G6;G7;P;O

HOFFMANN, K., WIESNER, H.: Ein subjektivistischer Zugang zur Optik in der Sekundarstufe I. Bericht über einen Unterrichtsversuch zur Vermittlung der Sender-Empfänger-Vorstellung. In: Naturwissenschaften im Unterricht - Physik/Chemie 32, 1984, 7-11
G6;G7;P;O

JUNG, W.: Vorstellungen von Schülern über Sehen und Licht. Ergebnisse von Untersuchungen an Schülern in 6. bis 10. Klassen. Polykopiert
G6;P;O

JUNG, W.: Versuche mit der Methode des "lauten Denkens" bei physikalischen Problemen. Arbeitspapier, Institut für Didaktik der Physik, Universität Frankfurt /M., n.d.
G5;G6;P;O;E

JUNG, W.: Untersuchungen zur elementaren Optik. Schriftliche Erhebungen und Interviews. Arbeitspapier, Institut für Didaktik der Physik, Universität Frankfurt/M., n.d.
G6;P;O

JUNG, W.: Erhebungen zu Schülervorstellungen in Optik (Sekundarstufe I). In: physica didactica 8, 1981, 137-163
G6;P;O

JUNG, W.: Zum Anfangsunterricht in Optik: Untersuchungen und didaktische Konsequenzen. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1981. Gießen: 1.Physikalisches Institut, 1981, 433-439
G1;G6;O;P

JUNG, W.: Conceptual Frameworks in Elementary Optics. In: Proceedings of the international workshop on "Problems Concerning Students' Representations of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 441-448
G6;P;O

JUNG, W.: Ergebnisse einer Optik-Erhebung. In: physica didactica 8 (1), 1981, 19-34
G6;P;O

JUNG, W.: Fallstudien zur Optik. In: physica didactica 9, 1982, 199-220
G6;P;O

JUNG, W.: Verständnisse und Mißverständnisse. physica didactica 14(1/2), 1987, 23-30
G1;G5;G6;P;O

KÄRRQVIST, C.: How Swedish Pupils, Age 12-15, Understand Light and its Properties. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 362-373
G6;P;O

LA ROSA, C., MAYER, M., PATRIZI, P., VICENTINI-MISSONI, M.: Commonsense Knowledge in Optics: preliminary results of an Investigation into the Properties of Light European Journal of Science Education 6, 1984, 387-397
G6;P;O

LEFEVRE, R., ESCANT, A.: Intervention de l'optique dans la vie quotidienne en relation avec les conceptions. Feuilles d'epistemologie appliquee et de didactiquw des sciences 8, 1986, 75-81
G6;P;O

NOCE, G., VICENTINI-MISSONI, M.: Investigations on the Commen Sense Knowledge of Adults: Gravity and Light. (not published)
G6;P;M;O

SIEMSEN, F.: Das Himmelsblau. In: physica didactica 8, 1981, 131-163
G6;P;O

STEAD, B., OSBORNE, R.J.: Exploring Students' Concept of Light. Paper presented to the New Zealand Association for Research in Education Conference. Wellington, Dezember 1979
G6;P;O

TIBERGHIEN, A., DELACOTE, G., GHIGLIONNE, R., MATALON, B.: Conception de la lumiere chez les enfants de 10-12 ans. In: Revue Francaise de Pedagogie (in press)
G6;P;O

WATTS, M.: Students Conceptions of light - a case study. Physics Education 20, 1985, 183-187
G6;P;O

WICKIHALTER, R.: Schülervorstellungen zum Sehen. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1983. Gießen: 1.Physikalisches Institut, 1983, 238-243
G6;P;O

WIESNER, H., CLAUS, J.: Vorstellungen zu Licht und Schatten bei Schülern der Primarstufe. Sachunterricht und Mathematik in der Grundschule 13, 1985, 318-322
G6;P;O

WIESNER, H.: Schülervorstellungen und Lernschwierigkeiten im Bereich der Optik. In: Duit, R., Jung, W., Rhöneck, C.v.(Hrsg.): Alltagsvorstellungen. Naturwissenschaften im Unterricht Physik/Chemie 34, April 1986, 26-29
G6;P;O

WUBBELS, T.: Elementaire begrippen in de geometrische optica:: leerlingenvoorstellingen en schoolboekteksten. Tijdschrift voor Didactiek der B-wetenschappen nr 1, jaargang 4, 1986 19-37
G6;P;O

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

P - Bereich der Physik	Area of physics
AT - Atome / Teilchen	- atoms / particles

AULT, C.R., NOVAK, J.D., GOWIN, D.B.: Constructing Vee Maps for Clinical Interviews on Molecule Concepts. Science Education 68, 1986, 441-462
G5;G6;P;AT

BARKE, H.D.: Irgendwas muß doch da sein - der Horror Vacui in den Schülervorstellungen vom Aufbau der Gase. Internes Arbeitspapier. Universität Hannover, Fachbereich Erziehungswissenschaften I, 1986
G6;P;AT

BAYER, H.J.: Schülervorstellungen über das Atom in der Sek II. In: MIKELSKIS, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie, 1984. Alsbach: Leuchtturm, 1985, 265-267
G6;P;AT

BLEICHROTH, W.: Was wissen unsere Volksschulkinder vom Atom ? In: Zeitschrift für Naturlehre und Naturkunde 13,1965, 89-94
G6;P;AT

BORN, G.: Der Atombegriff unserer Schüler. In: Physik und Didaktik 1, 1976, 66-71
G6;P;AT

BROOK, A., BRIGGS, H., DRIVER, R.: Aspects of Secondary Students' Understanding of the Particulate Nature of Matter. CIS: Childrens' Learning in Science Project. Centre for Studies in Science and Mathematics Education. The University Leeds, January 1984
G6;P;AT

CHAMPAGNE, A.B., HALBWACHS, F., MENEUT, M.: Representations and Their Role in Learning in the Fields of Mechanics and Transformations of Matter. In: Research on Physics Education. Proceedings of the first inter national workshop. La Londe les Maures, 1983, 629-634
G6;C;P;M;AT

CROS, D., MAURIN, M.: Conceptions of first-year university students of the constituents of matter and the notions of acids and bases. European Journal of Science Education, Vol. 8, No. 3, 1986, 305-313
G6;P;AT;C

DAHLMANN, W.: Zur Vorstellung vom kontinuierlichen bzw. vom diskontinuierlichen Aufbau der Materie. Eine empirische Untersuchung in der Sekundarstufe. 2. Teil chimica didactica 10, 1984, 223-271
G6;P;AT

DRIVER, R.: An Approach to Documenting the Understanding of 15 Years Old British Children About the Particulate Theory of Matter. In: Research on Physics Education. Proceedings of the first inter national workshop. La Londe les Maures, 1983, 339-346
G6;P;AT

DRIVER, R.: Beyond Appearence: The Conservation of Matter under Physical and Chemical Transformations. In: Driver, R., Guesne, E., Tiberghien, A. (Ed.): Children's Ideas in Science, 1985, 145-169
G6;P;M;AT;C

GILBERT, J.K., WATTS, M.: Concepts, Misconceptions and alternative Conceptions: changing perspectives in Science Education. Studies in Science Education 10, 1983, 61-98
G1;G6;P;E;EN;O;AT;T;C;B

GRÜTZMANN, P.: Die Vorstellung von "Teilchen versus Kontinuum" und "Erhaltung" bei Schülern des 7. bis 9. Jahrgangs zu Versuchen mit Verdunsten, Kondensieren, Lösen, Kristallisieren. Wissenschaftliche Hausarbeit zur Erlangung des Diploms in Erziehungswissenschaften. Kiel, 1980
G6;C;P;AT

HIBBARD, K.M., NOVAK, J.D.: Audio-Tutorial Elementary School Science Instruction as a Method for Study of Children's Concept Learning: Particulate Nature of Matter. In: Science Education 59 (4), 1975, 559-570
G6;P;AT

KIRCHER, E., HEINRICH, P.: Eine empirische Untersuchung über Atomvorstellungen bei Hauptschülern im 8. und 9. Schuljahr. chimica didactica 10, 1984, 199-222
G6;P;AT

KIRCHER, E.: Research in the Classroom About the Particle Nature of Matter (Grades 4-6). In: Proceedings of the International workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 342-364
G6;P;AT

KIRCHER, E.: Vorstellungen über Atome. In: Duit, R., Jung, W., Rhöneck, Ch.v. (Hrsg.): Alltagsvorstellungen. Naturwissenschaften im Unterricht Physik/Chemie 34, April 1986, 34-37
G6;P;AT

KIRCHER, E.: Research in the classroom about the Particle Nature of Matter (grades 4-6). Proceedings of the international workshop: Problems concerning Students' repres. of Physics and Chemistry knowledge. Ludwigsburg, Sept. 1981, 342-366.
G6;P;AT

KIRCHER, E.: Untersuchungen im Unterricht über "Kleinste Teilchen" (Atome). In: Der Physikunterricht 16 (1), 1982, 36-60
G6;P;AT

KNOTE, H.: Zur Atomvorstellung bei Dreizehn- bis Fünfzehnjährigen. In: Der Physikunterricht 4, 1975, 86-96
G6;P;AT

NICHOLSON, J.R., PHINIOS, D.: Matter and Models of Matter: A Pilot Study into Pupils Confusion. Kornhauser, A., Kholodilin, A.N.: Natural Sciences Social Sciences Interface. Educational Aspects. Ljubljana, 1981, 316-326
G6;P;AT

NICHOLSON, J.R., PHINIOS, D.: Matter and Models of Matter: A Pilot Study into Pupils Confusion. In: KORNHAUSER, A., KHOLODILIN, A.N.: Natural Sciences Social Sciences Interface. Educational Aspects. Ljubljana, 1981, 316-326
G6;P;AT

NOVICK, S., NUSSBAUM, J.: Junior High School Pupils' Understanding of the Particulate Nature of Matter: An Interview Study. In: Science Education 62, 1978, 273-281
G6;P;AT

NOVICK, S., NUSSBAUM, J.: Pupils' Understanding of the Particulate Nature of Matter: A Cross-Age Study. In: Science Education 65, 1981, 187-196
G6;P;AT

NSUMBU-A-NLAMBU, D.M.: Quelques conceptions d'eleves concernant le concept de chaleur In: Giordan, A., Martinand, J.-L.(Hrsg): Feuilles d'epistemologie appliquee et de didactique des sciences 8, 1986, 67-74
G6;P;AT

NUSSBAUM, J.: The Particulate Nature of Matter in the Gaseous Phase. Driver, R., Guesne, E., Tiberghien, A.(Ed.): Children's Ideas in Science
G6;G7;P;AT

NÖDING, S.: Was stellen sich die Schüler der Unter- und Mittelstufe unter einem Atom vor ? In: Der mathematische und naturwissenschaftliche Unterricht 22, 1969, 365-367
G6;P;AT

PFUNDT, H.: Das Atom - letztes Teilungsstück oder erster Aufbaustein ? Zu den Vorstellungen, die sich Schüler vom Aufbau der Stoffe machen . In: chimica didactica 7, 1981, 75-94
G6;P;AT

PFUNDT, H.: Untersuchungen zu den Vorstellungen, die Schüler vom Aufbau der Stoffe entwickeln. In: Der Physikunterricht 16 (1), 1982, 51-65
G6;P;AT

RHÖNECK, C. V.: Schüleräußerungen zum Problem der Volumenverminderung beim Mischen von Spiritus und Wasser. In: Der Physikunterricht 16 (1), 1982, 66-76
G6;P;AT

RIESCH, W., WESTPHAL, W.: Modellhafte Schülervorstellungen zur Ausbreitung radioaktiver Strahlung. In: Der Physikunterricht 9, 1975, 75-85
G6;P;AT

SCHOLLUM, B., OSBORNE, R.J.: Relating the new to the familiar. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science, 1985, 51-65
G6;G7;P;AT

SELLEY, N. J.: Scientific Models and Theories: Case Studies of the Practice of School Science Teachers. In: European Journal of Science Education 3 (1), 1981
G6;P;AT

STRAUSS, M.J., LEVINE, S.H.: Symbolism, Science and developing Minds. JCST, Dec.1985/Jan.1986, 190-195
G6;P;AT

SWARTZ, C.E.: Comment on "Misconceptions of Selected Science Concept Held by Elementary School Students". In: Journal of Research in Science Teaching 10, 1973, 383-384
G6;P;AT

WIGHTMAN, T., GREEN, P., SCOTT, P.: Children's learning in science project. The construction of meaning and conceptual change in classroom settings: Case studies on the particulate Nature of matter. Centre for Studies in Science and Mathematics Education, The University of Leeds, 1986
G6;G7;P;AT

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

P - Bereich der Physik	Area of physics
AS - Astronomie	- astronomy

DE VECCHI, G.: Comment on voit l'espace quand on est un enfant qui a les pieds sur terre. In: Giordan, A., Martinand, J.-L. (Hrsg.): Education scientifique etvie quotidienne, 1986, 421-426

G6;P;AS

DUPRE, F., NOCE, G., VICENTINI-MISSONI, M.: Die Gestalt der Erde und die Schwerkraft: Common-Sense Wissen von Erwachsenen. In: physica didactica 11, 1984, 3-21

G6;P;M;AS

KUBLI, F.: Kosmosvorstellungen als Indikatoren für kindliche Denkprozesse. In: physica didactica 10, 1983, 131-147

G6;P;AS

KUBLI, F.: Kosmosvorstellungen von Kindern und die Astronomie im Unterricht. In: NAMEYER, U., KAPUNE, T. (Hrsg.): Weltall und Weltbild. Kiel: Schmidt u. Klaunig/IPN, 1984, 75-96

G6;P;AS

MALI, G.B., HOWE, A.: Development of Earth and Gravity Concepts Among Nepali Children. In: Science Education 63 (5), 1979, 685-691

G6;P;AS

NOVAK, J.D.: Editorial Comments on "Development of Earth and Gravity Concepts Among Nepali Children". In: Science Education 63 (5), 1979, 719-720

G6;P;M;AS

NUSSBAUM, J., NOVAK J.D.: Interviews zur Beurteilung der Vorstellung von Kindern über die Erde. In: physica didactica 5, 1978, 33-51

G6;P;AS

NUSSBAUM, J., SHARODINI-DAGAN, N.: Changes in Second Grade Children's Preconceptions about the Earth as a Cosmic Body Resulting from a Short Series of Audio-Tutorial Lessons. Science Education 67, 1983, 99-114

G6;G7;P;AS

NUSSBAUM, J.: Children's Conception of the Earth as a Cosmic Body: A Cross-Age Study. In: Science Education 63, 1979, 83-93

G6;P;AS

NUSSBAUM, J.: The Earth as a Cosmic Body. In: Driver, R., Guesne, E., Tiberghien, A.(Ed.): Children's Ideas in Science

G6;G7;P;AS

NUSSBAUM, J.: Students perceptions of astronomical concepts. GIREPConference 1986 - COSMOS - an Educational Challenge; Proceedings Copenhagen, Denmark 1986, 87-97

G6;P;AS

OGAR, J.: Ideas about physical phenomena in spaceships among students and pupils. GIREP Conference 1986 - COSMOS - an Educational Challenge; Proceedings. Copenhagen, Denmark 1986, 376-378

G6;P;M;AS

PREECE, P.F.W.: Childrens' Ideas about the Earth and Gravity. In: PREECE, P., CLISH, D. (Ed.): The Teaching of Astronomy. Perspectives 18. University of Exeter. School of Education,1986, 67-73

G6;P;AS

SMITH, C.L., TREAGUST, D.F.: Learning and the acquisition of a knowledge structure for the discipline of astronomy. GIREP Conference 1986 - COSMOS - an Educational Challenge; Proceedings; Copenhagen, Denmark 1986, 387-390

G6;P;AS

G6;P;AS

SNEIDER, C., PULOS, S.: Children's Cosmographies: Understanding the Earth's Shape and Gravity. In: Science Education 67 (2), 1983, 205-221
G6;P;M;AS

TREAGUST, D.F., SMITH, C.L.: Secondary students understanding of the solar system: implication for curriculum revision. GIREP conference 1986 - COSMOS - an Educational Challenge; Proceedings; Copenhagen, Denmark 1986, 363-368
G6;P;AS

VICENTINI-MISSONI, M.: Earth and Gravity: Comparison Between Adult's and Children's Knowledge: In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 234-253
G6;P;AS

VIGLIETTA, M.L.: Earth, sky and motion. Some questions to identify pupils ideas. GIREP Conference 1986 - COSMOS - an Educational Challenge; Proceedings. Copenhagen, Denmark 1986
G6;P;AS

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

P	- Bereich der Physik	Area of physics
EN	- Energie	- energy

BARBETTA, M.G., LORIA, A., MASCELLANI, V., MICHELINI, M.: An Investigation on Students' Frameworks About Motion and the Concepts of Force and Energy. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 219-226
G6;P;M;EN

BERGE, O.E., HAUKE, B.: Schüler äußern sich über Energie. In: Naturwissenschaften im Unterricht - Physik/Chemie 31, 1983, 362-366
G6;M;P;EN

BLACK, P., SOLOMON, J.: Life World and Science World: Pupils' Ideas About Energy. In: MARX, G. (Ed.): Entropy in the School. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 1983, 43-55
G6;G7;P;EN;ENT

BLISS, J., OGBORN, J.: Children's Choices of Uses of Energy. European Journal of Science Education 7, 1985, 195-203
G6;P;EN

BROOK, A., DRIVER, R.: Aspects of Secondary Students' Understanding of Energy: Full Report. CIS: Childrens' Learning in Science Project. Centre for Studies in Science and Mathematics Education. The University of Leeds, 1984
G6;P;EN

BROOK, A., DRIVER, R.: Aspects of Secondary Students' Understanding of Energy: Summary Report. CIS: Childrens' Learning in Science Project. Centre for Studies in Science and Mathematics Education. The University of Leeds, 1984
G6;P;EN

BROOK, A.: Children's understanding of ideas about energy: a review of the literature. In: Energy Matters. Driver, R., Millar, R.(Ed.) Center for studies in Science and Mathematics Education, Leeds 1985, 33-45
G6;P;EN

DAHNCKE, H., DUIT, R., NIEDDERER, H.: A Hierarchy of Concepts and Principles. Some Types of Learning and Some Resultats Concerning the Concept of Energy for 5th Graders in the IPN Curriculum Physik. In: FREY, K., LANG, M. (Hrsg.): Kognitionspsychologie und naturwissenschaftlicher Unterricht. Bern: Huber, 1973, 341-365
G6;P;M;EN

DAHNCKE, H., WESTPHAL, W.: Methoden und Ergebnisse einer Untersuchung über Unterrichtsvoraus setzungen zum Prinzip von der Erhaltung der Energie. In: SCHMIDT, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Probleme und Perspektiven. Hannover: Schroedel, 1973, 105-116
G6;P;M;EN

DAHNCKE, H.: Teilaspekte der Energieerhaltung. Eine empirische Untersuchung einiger Voraussetzungen für Unterricht über das Prinzip von der Erhaltung der Energie bei 10 bis 14jährigen Kindern. Dissertation, Kiel, 1972
G6;P;M;EN

DRIVER, R., WARRINGTON, L.: Students' Use of the Principle of Energy Conservation in Problem Situations. Physics Education 20, 1985, 171-176
G6;P;EN

DUIT, R., ZELEWSKI, H.D. V.: Ohne Energie ist es düster in unserem Leben. In: Naturwissenschaften im Unterricht - Physik/Chemie 27, 1979 161-164
G6;P;M;EN

DUIT, R.: Der Satz von der Erhaltung der Energie in der Sekundarstufe I ? Empirische Ergebnisse. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1980. Gießen: I.Physikalisches Institut, 1980, 146-150
G6;P;EN

DUIT, R.: Understanding Energy as a Conserved Quantity - Remarks on the Article by R.U. Sexl. In: European Journal of Science Education 3, 1981, 291-301
G6;P;M;EN

DUIT, R.: Students' Notions About the Energy Concept - Before and After Physics Instruction. In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 268-319
G6;P;M;EN

DUIT, R.: Energy Conceptions Held by Students and Consequences for Science Teaching. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 316-321
G6;P;EN

DUIT, R.: Is the Second Law of Thermodynamics Easier to Understand than the First Law? In: MARX, G. (Ed.): Entropy in the School. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 1983, 87-97
G6;P;EN;ENT

DUIT, R.: Kraft, Arbeit, Leistung, Energie - Wörter der Alltagssprache und der physikalischen Fachsprache. In: physica didactica 11, 1984, 129-144
G4;G6;P;M;EN

DUIT, R.: Work, Force and Power - Words in Everyday Language and Terms in Mechanics. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 227-233
G4;G6;P;M;EN

DUIT, R. Untersuchungen zum Erlernen des Energiebegriffs. Kap. 4 des Bandes "Der Energiebegriff im Physikunterricht". Kiel: IPN, 1986, 168-255
G6;P;EN

DUIT, R.: Energievorstellungen. In: Duit, R., Jung, W., Rhöneck, Ch.v. (Hrsg.): Alltagsvorstellungen. Naturwissenschaften im Unterricht Physik/Chemie 34, April 1986, 7-9
G6;P;EN

GAYFORD, C.G.: Some aspects of the problems of teaching about energy in school biology. European Journal of Science Education Vol. 8, No. 4, 1986, 443-450
G6;P;EN

GENET, M.-F., GAGLIARDI, R.: Representation spontanee sur l'energie des eleves de 1ere (16-18 ans). In: Giordan, A., Martinand, J.-L. (Hrsg.): Feuilles d'epistemologie appliquee et de didactique des sciences 8, 1986, 51-57
G6;P;EN

GILBERT, J.K., WATTS, M.: Concepts, Misconceptions and alternative Conceptions: changing perspectives in Science Education. Studies in Science Education 10, 1983, 61-98
G1;G6;P;E;EN;O;AT;T;C;B

JENELTEN-ALLKOFER, C., DUIT, R.: Entwicklung des Energiebegriffs bei 5- bis 16-Jährigen. In: Naturwissenschaften im Unterricht - Physik/Chemie 12, 1980, 408-413
G6;P;M;EN

KOLIOPOULOS, D., TIBERGHIEN, A.: Elements d'une bibliographie concernant l'enseignement de l'energie au niveau des colleges. ASTER. recherches en didactique des sciences experimentales No 2/1986. Institut National de Recherche Pedagogique 29, Paris, 167-178
G6;P;EN

MANTHEI, U., TÄUBERT, P.: Zustandsgröße und Prozeßgröße erläutert am Beispiel Energie - Arbeit, Wärme, Strahlung. In: Physik in der Schule 19 (7/8), 1981, 307-317
G6;P;M;T;EN

MAYER, M.: Understanding the functioning of simple domestic appliances in relation to scientific concepts. CEDE - Centro dell 'Educazione Villa Falconieri, Frascati, Working paper, n.d.
G6;P;EN;T

MCCLELLAND, J.A.G.: An Approach to the Development and Assessment of Instruction in Science at Second Grade Level, the Concept of Energy. Thesis, Cornell University, Ithaca, N.Y., 1970
G6;P;M;EN

PIAGET, J., DE LANNOY, J.: La formation de la notion de force. Kap.V, La transmission de l'energie entre deux pendules relies par un fil. Presses Universitaires, Paris, 1973
G6;P;M;EN

RHONECK, C. V., DUIT, R.: Empirische Daten zur Entwicklung des Energiebegriffs. In: Der Physikunterricht 12 (2), 1978, 60-71
G6;P;EN

RHONECK, C. V.: Lernschwierigkeiten beim Energieerhaltungssatz der Mechanik im Zusammenhang mit Reibungsphänomenen. In: physica didactica 6, 1979, 221-227
G6;P;M;EN

SCHAEFER, G.: Der Beitrag des Biologieunterrichts zur Entwicklung eines Energiebewußtseins. Vortrag auf der MNU/SIL-Tagung "Weltproblem Energie" 9. - 11.3.1980 in Koblenz
G6;P;EN

SCHAEFER, G.: The Concept Triangle Energy-Information-Order in the Heads of Our Students. In: MARX, G. (Ed.): Entropy in the School. Proceedings of the 6th Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 1983, 66-86
G6;P;INF;EN

SCHAEFER, G.: Empirical Studies on Concept Formation. The Concept of "Energy" and "Health" in West-German Schools. University of Hamburg
G6;P;B;EN

SCHENK, B.: Was verstehen Schüler der Sekundarstufe II unter dem Begriff Energie ? In: physica didactica 9, 1982, 61-70
G6;P;EN

SOLOMON, J.: How Children Learn About Energy or Does the First Law Come First? In: The School Science Review 63 (224), 1982, 415-422
G6;G7;P;M;EN

SOLOMON, J.: Learning About Energy: How Pupils Think in Two Domains. In: European Journal of Science Education 5 (1), 1983, 49-59
G6;G7;P;M;EN

SOLOMON, J.: Prompts, Cues and Discrimination: the Utilization of two seperate Knowledge Systems. European Journal of Science Education 6, 1984, 277-284
G1;G6;P;EN

SOLOMON, J.: Teaching the conservation of energy. Physics Education 20, 1985, 165-170
G6;G7;P;EN

SOLOMON, J.: Background Ideas About Energy. Working Paper, Centre for Science Education, Chelsea College, Bridge Place, London SW6
G6;P;M;EN

STEAD, B.: Energy. Working Paper No. 17, Learning in Science Project, University of Waikato, 1980
G6;P;EN

WARREN, J.W.: The Nature of Energy. In: European Journal of Science Education 4 (3), 1982, 295-297
G6;P;EN

WATTS, D.M.: An Exploration of Student's Understanding of the Concepts "Force" and "Energy". Paper represented at the International Conference on Education for Physics Teaching. Trieste, 1980
G6;P;M;EN

WATTS, M.: Some Alternative Views of Energy. In: Physics Education 18, 1983, 213-217
G6;P;EN

WATTS, M. : Using Networks to Represent Pupils' Meanings for Concepts of Force and Energy. In: BLISS, J., MONK, M., OGBORN, J. (Eds.): Qualitative Data Analysis for Educational Research. London, Canberra: Croom Helm, 1983, 89-98
G6;P;M;EN

WELCH, W.W.: Learning about energy: A review of the literature. Science Education Research Unit, University of Waikato, Hamilton, N.Z. 1984
G6;P;EN

WHEELER, A.E.: Misconceptions in Elementary Science - A Kellyian Perspective. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 304-309
G1;G6;P;EN

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

P - Bereich der Physik	Area of physics
- Sonstige	- others

ABDEL-WAHAB, M.C.: Levels of understanding of new physics laws. The University of Wisconsin-Madison, Ph.D, 1978
G6;P;Q

AGUIRRE, J., ERICKSON, G.: Students' Conceptions About the Vector Characteristics of Three Physics Concepts. In: Journal of Research in Science Teaching 21 (5), 1984, 439-457
G6;P

AIELLO-NICOSIA, M.L., SPERANDEO-MINEO, R.M.: An Experimental Study of the Relationship Between Formal Thinking and Physics Achievment. In: Journal of Research in Science Education 4 (2), 1982, 203-211
G6;P

BANHOLZER, A.: Die Auffassung physikalischer Sachverhalte im Schulalter. Dissertation, Tübingen, 1936
G6;P

BARZ, W., RIESCH, W., WESTPHAL, W.: Interviews mit Schülern am Beispiel von Untersuchungen von Lernvoraussetzungen für Physikunterricht. In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie I. Hannover: Schroedel, 1973, 66-71
G6;P

BAYER, H.-J.: Schülervorstellungen beim Übergang vom Bohrschen zum wellenmechanischen Atommodell. In: Kuhn, W. (Hrsg.): Didaktik der Physik; Vorträge, Physikertagung, Giessen 1986, 249-256
G6;P

BLACK, P., SOLOMON, J.: Life World and Science World: Pupils' Ideas About Energy. In: MARX, G. (Ed.): Entropy in the School. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 1983, 43-56
G6;G7;P;EN;ENT

BLISS, J.: Ideas of Chance and Probability in Children and Adolescents. In: Physics Education 13, 1978, 408-413
G6;STAT;IRR

BORMANN, M.: Das Schülerverständnis zu Elektronen. In: Kuhn, W.(Hrsg.): Didaktik der Physik; Vorträge, Physikertagung, Giessen 1986, 227-232
G6;P

BRÄMER, R.: Über die Wirksamkeit des Physikunterrichts. In: Naturwissenschaften im Unterricht - Physik/Chemie 28 (1), 1980, 10-17
G6;P

DAUMENLANG, K.: Physikalische Konzepte junger Erwachsener. Ihre Abhängigkeit von Schule und Familienkonstellation. Dissertation, Nürnberg, 1969
G6;P

DUIT, R.: Students' Notions (Preconceptions) and the Learning of Physics Concepts. In: Diwang Pisika 2 (1), 1981, 2-9
G6;P

DUIT, R.: Is the Second Law of Thermodynamics Easier to Understand than the First Law? In: MARX, G. (Ed.): Entropy in the School. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 1983, 87-97
G6;P;EN;ENT

ERICKSON, G., AGUIRRE, J.: Students' Intuitions and Science Instructions: Stability and Task Context in Students' Thinking about Vector Quantities. Paper presented at the Annual Meeting of the Canadian Society for the Study of Education, Montreal, May 1986
G6;P

G6;P;others

FAUCHER, G.: Advanced Physics Cources Do Not Provide Students With Conceptual Change. In: Proceedings of the International Seminar – Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 322-327
G6;P;E;M;MAG

GORITZ, J., WIESNER, H.: Wie verstehen Schüler Probleme der Quantenphysik? Praxis der Naturwissenschaften Physik, 1984, 90-92
G6;P;Q

HAUPT, G.W.: Concepts of Magnetism Held by Elementary School Children. In: Science Education 36, 1952, 162-168
G6;P;MAG

HEEGE, R., SCHWANEBERG, R.: Zur Anschaulichkeit elektrischer und magnetischer Felder. In: Kuhn, W.(Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1985 München. DPG Fachausschuß Didaktik der Physik, 1985, 275-282
G6;P;E;FLD;MAG

HELM, H.: Misconceptions in Physics Amongst South African Students. In: Physics Education 15, 1980, 92-97, 108
G6;P

HEWSON, P.W.: A Case Study of Conceptual Change in Special Relativity: The Influence of Prior Knowledge in Learning. In: European Journal of Research in Science Education 4 (1), 1982, 61-78
G6;P;R

HILBERT, M.: Untersuchungen zur Physik des Schulkindes. In: Westermanns Pädagogische Beiträge 5, 1953, 19-28
G6;P

INHELDER, B.: The Development of the Concepts of Chance and Probability in Children. In: OVERTON, W., McCARTHY GALLAGHER, J. (Eds.): Knowledge and Development. New York, Plenum Press, 1977, 43-67
G6;STAT;IRR

IVOWI, U.M.O.: Misconceptions in Physics Amongst Nigerian Secondary School Students. In: Proceedings of the International Seminar – Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 356-361
G6;P

IVOWI, U.M.O.: Misconceptions in Physics Amongst Nigerian Secondary School Students. In: Physics Education 19, 1984, 279-286
G6;P

KONOLD, C.E.: Informal Conceptions of Probability. In: Proceedings of the International Seminar – Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 163-193
G6;P;STAT

LINKE, R.D., VENZ, M.I.: Misconceptions in Physical Science Among Nonscience Background Students. In: Research in Science Education 9, 1979, 103-109
G6;P

LYBECK, L.: Some Real Pictures from the Classroom-based Research in Physics Teaching at Göteborg. Paper presented at the "Cognitive Development Research Seminar, Science and Mathematics Education". Leeds, September 1979
G6;P

MACHOLD, A.: Schülervorstellungen vor und während des Unterrichts in spezieller Relativitätstheorie. physica didactica 9, 1982, 175-189
G6;P;R

MALONY, D.P.: Cognitive Physics Educational Research – a Bibliography. Physics Department. Creighton University. Omaha, 1984
G1;G6;G7;P

MANTHEI, U.: Raumvorstellungen und Raumbegriffe im Physikunterricht der Klasse 6. In: Physik in der Schule 4, 1966, 429-432 und 443-446
G6;P

MANTHEI, U.: Empirische Untersuchungen zum Denken 12- bis 13-jähriger Schüler bei der Lösung physikalischer Probleme. In: Physik in der Schule 4, 1966, 61-65 und 115-119
G6;P

MANTHEI, U.: Über das naive Erklären physikalischer Sachverhalte durch 12- bis 13-jährige Schüler. In: Physik in der Schule 5, 1967, 431-436 und 491-494
G6;P

MANTHEI, U.: Eine Studie zur Begriffsbildung im Physikunterricht. In: Physik in der Schule 5, 1967, 111-119 und 247-252
G6;P

MCDERMOTT, L.C., ROSENQUIST, M., POPP, B., ZEE, E.v. : Identifying and Overcoming Student Conceptional Difficulties in Physics. Paper presented at the AERA Meeting, Montreal, 1983
G6;P

NIELSEN, H., THOMSEN, P.V.: Gymnasie Fysik. Rapport nr.1. Hverdagsforestillinger om Fysik. Det Fysiske Institut. Aarhus Universitet, 1983
G6;P

NUSSBAUM, J.: The Effect of the SCIS's "Relativity" Unit at the Childs Conception of Space. In: Journal of Research in Science Teaching 16, 1979, 45-51
G6;P

PELLA, M.O., VOELKER, A.M.: Teaching the Concepts of Physical and Chemical Change to Elementary School Children. In: Journal of Research in Science Teaching 5, 1967/68, 311-323
G6;C;P

PFUHL RODRIGUES, D.M.A. V.: Notions of Physical Laws in Childhood. In: Science Education 64 (1), 1980, 59-84
G6;P

PIAGET, J., INHELDER, B.: The Origin of the Idea of Chance in Children. London: Routledge & Kegan Paul, 1975
G6;STAT;IRR

PIAGET, J.: Die Entwicklung des Erkennens II. Das physikalische Denken. Stuttgart: Klett, 1973
G1;G6;P

ROBERTSON, W.W., RICHARDSON, E.: The Development of Some Physical Science Concepts in Secondary School Students. In: Journal of Research in Science Teaching 12, 1975, 319-326
G6;P

SCHAEFER, G.: The Concept Triangle Energy-Information-Order in the Heads of Our Students. In: MARX, G. (Ed.): Entropy in the School. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 1983, 66-86
G6;P;INF;EN

SCHAEFER, G.: Information und Ordnung - zwei mächtige Begriffe unserer Zeit. In: SCHAEFER, G. (Hrsg.): Information und Ordnung. Köln: Aulis, 1984, 9-45
G6;P;INF;STAT;ENT

SCHENK, B.: Lernerbiografien Physik. In: physica didactica 9, 1982, 249-256
G6;P

SCHÄFER, K.: Von der Alltagserfahrung zur Newtonschen Mechanik. In: KUHN, W. (Hrsg): Didaktik der Physik. Vorträge der Physikertagung 1984. Gießen: DPG-Fachausschuß Didaktik der Physik, 1984, 166-172
G1;G5;G6;P

SMITH, C.L., CAREY, S., WISER, M.: On differentiation: A case study of the development of the concepts of size, weight and density. Cognition, Vol. 21, Nr. 3, 1985, 177-237
G6;P

SPRECKELSEN, K.: Schülervorstellungen im Grundschulalter. In: Bleichroth, W.(Hrsg): Aufsätze zur Didaktik der Physik. physica didactica 13, Sonderheft, 1986, 103-108
G1;G6;P

VIENNOT, L.: The Implication of Mathematical Structure Versus Physical Content: Report on a Research Done by S. Pauconnet. In: Proceedings of the International workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 79-91
G6;P

VIENNOT, L.: Implicit Statements in Physics: Students and Constants. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 355-361
G6;P

VIENNOT, L.: Implicit Statements in Physics: Students and Constants. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 133-136
G6;P

VOELKER, A.M.: Elementary School Children's Attainment of the Concepts of Physical and Chemical Change. A Replication. In: Journal of Research in Science Teaching 12, 1975, 5-14
G6;C;P

WEERDA, J.: Begriffe der Chemie und Physik in der Sprache der Kinder und der Wissenschaften. Frankfurt: Lang, 1978
G6;C;P

ZIETZ, K.: Physikalische Theorien bei Kindern. Bericht über den XV. Kongreß der Deutschen Gesellschaft für Psychologie. Jena, 1937
G6;P

ZIETZ, K.: Physikalische Theorien bei Kindern. In: Die Deutsche Schule 42, 1938, 205-210
G6;P

ZIETZ, K.: Das physikalische und technische Denken des Kindes. In: Bayerische Lehrerzeitung 12, 1938, 180-184
G6;P

ZIETZ, K.: Kind und physische Welt. München: 1955
G6;P

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

C - Bereich der Chemie Area of chemistry

ANDERSSON, B.R., RENSTROM, L.: How Swedish Pupils, Age 12-16, Explain the "Phosphorus" Problem. Leeds-Göteborg Study, Pupils' Content Oriented Reasoning in Science, Working Paper 4, EKNA-project 1982. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1982
G6;C

ANDERSSON, B.R., RENSTROM, L.: Oxidation of Steel Wool. EKNA-report No.7. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1983
G6;C

ANDERSSON, B.R.: Chemical Reactions. EKNA-report No.12. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1984
G6;C

ANDERSSON, B.R.: Pupils Explanations of some Aspects of Chemical Reactions. Science Education 70, 5, 1986, 549-563
G6;C

ARZI, H.: The Long-Term Kinetics of Conceptual Development: The Case of + = - and Contextual Differentation. Research in Science Education 18, Australian Science Education Research Association, 1988, 112-121
G6;C

BARKE, H.D.: Probleme bei der Verwendung von Symbolen im Chemieunterricht. Eine empirische Untersuchung an Schülern der Sekundarstufe I. In: Naturwissenschaften im Unterricht - Physik/Chemie 30 (4), 1982, 131-133
G6,C

BUCK, P.: Vorstellungen hinter dem Begriff "Stoff". In: Duit, R., Jung, W., Rhöneck, C.v.(Hrsg.): Alltagsvorstellungen. Naturwissenschaften im Unterricht Physik/Chemie 34, April 1986, 38-42
G6;C

BUELL, R.R., BRADLEY, G.: Piagetian Studies in Science: Chemical Equilibrium Understanding from Study of Solubility: A Preliminary Report from Secondary School Chemistry. In: Science Education 56 (1), 1972, 23-29
G6;C

BUTHIG, W.: Schülerkenntnisse über Stoffe der Natur. Untersuchung über die Anfänge der Chemie im Weltbild Zehnjähriger. In: Sachunterricht und Mathematik in der Grundschule 4, 1976, 526-531
G6;C

CHAMPAGNE, A.B., HALBWACHS, F., MEHEUT, M.: Representations and Their Role in Learning in the Fields of Mechanics and Transformations of Matter. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 629-434
G6;C;P;M;AT

CROS, D., MAURIN, M.: Conceptions of first-year university students of the constituents of matter and the notions of acids and bases. European Journal of Science Education, Vol. 8, No. 3, 1986, 305-313
G6;P;AT;C

DRIVER, R.: Beyond Appearance: The Conservation of Matter under Physical and Chemical Transformations. In: Driver, R., Guesne, E., Tiberghien, A. (Ed.): Children's Ideas in Science, 1985, 145-169
G6;P;M;AT;C

DUNCAN, I.M., JOHNSTONE, A.H.: The Mole Concept. In: Education in Chemistry 10 (6), 1973, 213-214
G6;C
FLADT, R.: Ehrenwerte Irrtümer von Schülern – und was wir daraus lernen könnten! In: Der Chemieunterricht 12 (1), 1981, 67-71
G6;C
FREY, K., PFUNDT, H., LEHRKE, M., BAYRHUBER, H., JENELTEN-ALLHOFER, C.: Nutzung psychologischer Methoden und Erkenntnisse bei der Vorbereitung naturwissenschaftlicher Curricula. Kiel: IPN, polykop. 1982
G1;G5;G6;C
GENNARO, E.D.: Assessing Junior High Students' Understanding of Density and Solubility. In: School Science and Mathematics 81, 1981, 399-404
G6;C;P;B
GILBERT, J.K., WATTS, M.: Concepts, Misconceptions and alternative Conceptions: changing perspectives in Science Education. Studies in Science Education 10, 1983, 61-98
G1;G6;P;E;EN;O;AT;T;C;B
GORODETSKY, M., GUSSARSKY, E.: Misconceptualization of the chemical equilibrium concept as revealed by different evaluation methods. European Journal of Science Education, Vol. 8, No. 4, 1986, 427-441
G5;G6;C
GORODETSKY, M., HOZ, R.: Changes in the Group Cognitive Structure of some Chemical Equilibrium Concepts Following a University Course in General Chemistry. Science Education 69, 1985, 185-199
G6;C
GRÜTZMANN, P.: Die Vorstellung von "Teilchen versus Kontinuum" und "Erhaltung" bei Schülern des 7. bis 9. Jahrgangs zu Versuchen mit Verdunsten, Kondensieren, Lösen, Kristallisieren. Wissenschaftliche Hausarbeit zur Erlangung des Diploms in Erziehungswissenschaften. Kiel, 1980
G6;C;P;AT
HACKLING, M.W., GARNETT, P.: Misconceptions of Chemical Equilibrium. European Journal of Science Education 7, 1985, 205-214
G6;C
HALL, J.R.: Conservation Concepts in Elementary Chemistry. In: Journal of Research in Science Teaching 10, 1973, 143-146
G6;C
HAUPT, P.: Lernvorgänge bei der Begriffsbildung im Chemieunterricht. Dargestellt am Beispiel: Verbrennung – Oxidation. In: HÄRTEL, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1979, 65-67
G6;C
HAUPT, P.: Probleme des Auffassungsvermögens bei der Begriffsbildung im Chemieunterricht – dargestellt am Beispiel Verbrennung – Oxidation. Dissertation. Oldenburg, 1980
G6;C
HAUPT, P.: Schülervorstellungen zur Verbrennung. In: Naturwissenschaften im Unterricht – Physik/Chemie 29, 1981, 347-350
G6;C
HAUPT, P.: Verbrennungs- und Oxidationsvorgänge im Verständnis von Schülern. Köln: Aulis, 1984
G6;C
HAUPT, P.: Die chemische Verbindung aus der Sicht der Schüler. Ergebnisse einer empirischen Untersuchung. (unveröffentlicht)
G6;C
HERRON, J.D.: Piaget for Chemists. In: Journal of Chemical Education 52, 1975, 146-150
G6;C

HOLDING, B.: Aspects of Secondary Students' Understanding of Elementary Ideas in Chemistry: Summary Report. Children's Learning in Science Project. Centre for Studies in Science and Mathematic Education. The University of Leeds, 1985
G8;C

JOHNSTONE, A.H., MacDONALD, J.J., WEBB, G.: Misconceptions in School Thermodynamics. In: Physics Education 12 (4), 1977, 248-251
G8;C;P;T

KEMPA, R.F., HODGSON, G.E.: Levels of Concept Acquisition and Concept Maturation in Students of Chemistry. In: British Journal of Educational Psychology 46, 1976, 253-260
G8;C

KLEMMER, G., REICHWEIN, A.: Zum emotional-affektiven Aspekt von Chemieunterricht. Vorstudie. In: chimica didactica 3, 1977, 117-128
G8;C

LEE, K.-W.: Cognitive Variables in Problem Solving in Chemistry. Research in Science Education 15, Australian Science Education Research Association, 1985, 43-50
G8;C

LYBECK, L., MARTON, F., STRÖMDAHL, H., TULLBERG, A.: The phenomenography of the "mole concept". An example of how the study of students' understanding can contribute to the advancement of science and science education. In: Ramsden, P.(Ed.): Improving learning: new perspectives. London: Kogan Page, inprint
G8;C

LYBECK, L., STRÖMDAHL, H., TULLBERG, A.: Students' Conceptions of Amount of Substance and its SI Unit 1 Mol. Department of Education and Educational Research. Gothenburg University, 1985
G8;C

LYBECK, L., STRÖMDAHL, H., TULLBERG, A.: En Kemididaktisk studie av N-elevers uppfattningar av storheten substansmängd och dess si-enhet 1 mol. Göteborgs Universitet Institutionen för pedagogik
G8;C

MEHEUT, M., SALTIEL, E., TIBERGHIEN, A.: Pupils' (11-12 year olds) conceptions of combustion. European Journal of Science Education 7, 1985, 83-93
G8;C

NAY, U.: Schulkindliche Deutungen von Chemischen Versuchen als Grundlage der sequentiellen Plazierung von Lerninhalten. In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1973, 144-146
G8;C

NAY, U., GLATZEL, D.: Schulkindliche Identifizierung von Säuren und Laugen. In: Sachunterricht und Mathematik in der Primarstufe 6, 1978, 144-148
G8;C

NAY, U.: Entwicklungspsychologische Parameter bei der Erprobung des Nuffield-Projekts. In: Der mathematische und naturwissenschaftliche Unterricht 31, 1978, 483-488
G8;C

NOVICK, S., MENIS, J.: A Study of Student Perceptions of the Mole Concept. In: Journal of Chemical Education 53, 1976, 720-722
G8;C

PELLA, M.O., VOELKER, A.M.: Teaching the Concepts of Physical and Chemical Change to Elementary School Children. In: Journal of Research in Science Teaching 5, 1967/68, 311-323
G8;C;P

PETERSON, R., TREAGUST, D.F., GARNETT, P.: Identifications of Secondary Students' Misconceptions of Covalent Bonding and Structure Concepts Using a Diagnostic Instrument. Research in Science Education 16, 1986, 40-48
G8;C

PFUNDT, H.: Pre-instructional Conceptions About Substances and Transformations of Substances. In: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg, 1981, 320-341
G6,C

PFUNDT, H.: Vorunterrichtliche Vorstellungen von stofflicher Veränderung. chimica didactica 8, 1982, 161-180
G6;C

SCHARF, V., BRINKMANN, H., OVERKAMP, M.: Rückgewinnung von Stoffen. Ein Schlüsselprozeß für den Unterricht, dargestellt an einer Modellreaktion. In: Naturwissenschaften im Unterricht - Physik/Chemie 30 (6), 1982, 219-223
G6;C

SCHMIDT, H.J.: Schüler auf dem Wege zum Verständnis von chemischen Formeln und Gleichungen. MNU 36, 1983, 417-424
G6;C

SELLEY, N. J.: An Examination of the Understanding of Certain Chemical Concepts by Pupils Preparing for G.C.E. Advanced Level. M.Ed.thesis. King's College, London, 1973
G6,C

STAVY, R., STACHEL, D.: Childrens' Ideas about Solid and Liquid. Israeli Science Teaching Center. School of Education. Tel-Aviv University, 1984
G6;C

STAVY, R., STACHEL, D.: Childrens Conception of Changes in the State of Matter: from Solid to Liquid. Archives de Psychologie, 1985
G6;C

STÜCKRATH, F.: Die Anfänge der Chemie im Weltbild des Kindes. In: Westermanns Pädagogische Beiträge 5, 1953, 403-410
G6;C

VOELKER, A.M.: Elementary School Children's Attainment of the Concepts of Physical and Chemical Change. A Replication. In: Journal of Research in Science Teaching 12, 1975, 5-14
G6;C;P

VOORDE, H.H. TEN.: Level Raise in Chemistry Education. Paper represented at the "Cognitive Development-Research Seminar, Science and Mathematics Education", Leeds, September 1979
G6;C

WEERDA, J.: Begriffe der Chemie und Physik in der Sprache der Kinder und der Wissenschaften. Frankfurt: Lang, 1978
G6;C;P

WEERDA, J.: Untersuchungen zum Modellbegriff in der Chemie: eine empirische Untersuchung bei Schülern. Frankfurt/Main, Bern: Lang, 1982
G6;C

WHEELER, A.E., KASS, H.: Student Misconceptions in Chemical Equilibrium. In: Science Education 62 (2), 1978, 223-232
G6;C

G6 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

B - Bereich der Biologie Area of biology

AMEH, C., GUNSTONE, R.: Teachers' Concepts in Science. Research in Science Education 15, Australian Science Education Research Association, 1985, 151-157
G6;G8;P;M;E;B

AMEH, C., GUNSTONE, R.: Science Teachers' concepts in Nigeria and Australia. In: Research in Science Education 16, 1986, 73-81
G6;G8;P;E;M;B

ANDERSON, C.W., SMITH, E.L.: Children's Preconceptions and Content-Area Textbooks. In: DUFFY, G., et al(Ed.): Comprehension Instruction: Perspectives and Suggestions. New York: Longman, 1983, 187-201
G6;G7;P;O;B

ANGUS, J.W.: Children's Conceptions of the Living World. Australian Science Teacher's Journal, 27(3), 1981, 65-68
G6;B

ARNAUDIN, M.W., MINTZES, J.J.: Students' Alternative Conceptions of the Human Circulatory System: a Cross Age Study. Science Education 69, 1985, 721-733
G6;B

BARKER, M.A.B.: The Description and Modification of Children's Views of Plant Nutrition. University of Waikato, 1985
G6;B

BARRASS, R.: Some misconceptions and misunderstandings perpetuated by teachers and textbooks of biology. Journal of Biological Education, 1984, 201-206
G6;B

BELL, B., BARKER, M.: Towards a scientific concept of "animal". Journal of Biological Education, 16(3), 1982, 197-200
G6;B

BELL, B., BROOK, A.: Aspects of Secondary Students' Understanding of Plant Nutrition: Full Report. CIS: Childrens' Learning in Science Project. Centre for Studies in Science and Mathematics Education. The University of Leeds, 1984
G6;B

BELL, B., BROOK, A.: Aspects of Secondary Students' Understanding of Plant Nutrition: Summary Report. CIS: Childrens' Learning in Science Project. Centre for Studies in Science and Mathematics Education. The University of Leeds, 1984
G6;B

BELL, B.: Students' ideas about plant nutrition: what are they. Journal of Biological Education, 19(3), 1985, 213-218
G6;B

BISHOP, B.A., ANDERSON, C.W.: Students conceptions of natural selection and its role in evolution. Paper presented at the annual conference of NARST, Indiana, April 1985
G6;B

BRUMBY,M.N.,GARRARD,J.E.,AUMAN, J.:Student's Perception of the Concept of Health. European Journal of Science Education 7, 1985, 307-323
G6;B

BRUMBY, M.N.: Problems in learning the concept of natural selection. Journal of Biological Education 13, 1979
G6;B

BRUMBY, M.N.: Student's perceptions of the concept of life. Science Education 66 (4), 1982, 613-622
G6;B

G6;B

BRUMBY, M.N. Misconceptions about the Concept of Natural Selection by Medical
Biology Students. In: Science Education 68, 1984, 493-503
G6;B
CALAFATE, L.C.: Paradigmes cognitifs dans la salle de classe a propos de l'idee
d'adaptation des vivants. In: Giordan, A., Martinand, J.-L.(Hrsg): Feuilles
d'epistemologie appliquee et de didactique des sciences 8, 1986, 83-94
G6;B
CABAL, P., BASILLA, C.: Une etude sur le niveau de structuration des concepts
"Photosynthese" et "respiration" des etudiants de l'ecole normale. In: Giordan,
A., Martinand, J.-L.(Hrsg.): Feuilles d'epistemologie appliquee et de
didactique des sciences 8, 1986, 39-44
G6;B
CHO,H.-H., KAHLE,J.B., NORDLAND,F.H.: An Investigation of High School Biology
Textbooks as Sources of Misconceptions and Difficulties in Genetics and some
Suggestions for Teaching Genetics. Science Education 69, 1985, 707-719
G6;B
DEADMAN, J.A., KELLY, P.J.: What do secondary schoolboys understand about
evolution an heredity before they are taught the topics? Journal of Biological
Education 12 (1), 1978, 7-15
G6;B
ENGEL CLOUGH, E. WOOD-ROBINSON, C.: Children's understanding of inheritance.
Journal of Biological Education, 19 (4), 1985, 304-310
G6;B
ENGEL CLOUGH, E., WOOD-ROBINSON, C.: How secondary students interpret instances
of biological adaptation. Journal of Biological Education, 19 (2), 1985,
125-130
G6;B
ENGEL CLOUGH, E., DRIVER, R.: A Study of Consistency in the Use of Students'
Conceptual Frameworks Across Different Task Contexts. Science Education 70 (4),
1986, 473-496
G6;P;M;T;B
ENGESTROM, Y.: The Laws of Nature and the Origin of Life in Pupils'
Consciousness: A Study of Contradictory Modes of Thought. In: Scandinavian
Journal of Educational Research, 1981, No.25, 39-61
G6;B
FISHER, K.M. ET AL.: Student Misconceptions and Teacher Assumptions in College
Biology. Paper presented at the American Association for the Advancement of
Science Annual Meeting, New York, 1984
G6;B
FISHER, K.M.: Amino Acids and Translation: A Misconception in Biology. In:
Proceedings of the International Seminar - Misconceptions in Science and
Mathematics. Cornell University, Ithaca, N.Y., 1983, 407-419
G6;B
FISHER, K.M.: A Misconception in Biology: Amino Acids and Translation. Journal of
Research in Science Teaching 21, 1985, 53-62
G6;B
GILBERT, J.K., WATTS, M.: Concepts, Misconceptions and alternative Conceptions:
changing perspectives in Science Education. Studies in Science Education 10,
1983, 61-98
G1;G6;P;E;EN;O;AT;T;C;B
GIORDAN, A., NGUYEN-LIN, M., DE VECCHI, G., RAICHVARG, D.: Categories of
conceptions about sexuality and some of their didactical consequences.
Laboratoire de didactique et epistemologie de science (LDES). University of
Geneva, Switzerland
G6;B

GIORDAN, A.: Learning process (and obstacles thereto) of science pupils aged 6-14. Council of Europe, Council for cultural co-operation, Educational research workshop on science in prim. educ., Edinburgh, Sept. 1984
G6;G7;B

GRIFFITHS, K.M.: An Investigation into the Development of Concepts of Animism in Selected Primary School Children. Ph.D.thesis, University of Birmingham, 1977
G6;B

HACKLING, M.W., TREAGUST, D.F.: Research Data necessary for meaningful Review of Grade Ten High School Genetics Curricula. Journal of Research in Science Teaching 21, 1984, 197-209
G6;B

KARGBO, D.B., HOBBS, E.D., ERICKSON, G.L.: Children's beliefs about inherited characteristics. Journal of Biological Education 14(2), 1980, 137-146
G6;B

KINNEAR, J.: Identification of Misconceptions in Genetics and the Use of Computer Simulations in Their Correction. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 84-92
G6;G7;B

LEEDS, M.J.: Mental Models of Learners about Energy Metabolism. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, San Francisco, March 1986
G6;B

LONGDEN, B.: Genetics - are there inherent learning difficulties? Journal of Biological Education, 1982, 135-140
G6;B

MENDEZ DE GAGLIARDI, M., CANAY DE MENDEZ, A.-M., GAGLIARDI, R.: L'insuline est necessaire pour diminuer le sang epais! In: Giordan, A., Martinand, J.-L.(Hrsg.): Education scientifique et vie quotidienne, 1988, 209-213
G6;B

MINTZES, J.J.: Naive Theories in Biology: Children's Concepts of the Human Body. School Science and Mathematics, Vol 84(7), 1984, 548-555
G6;B

MURRAY, D.L.: Misconceptions of Osmosis. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 428-433
G6;B;P;M

NOCE, G., STRUBBERG, S.: Les conceptions sur la reproduction et l'heredite: une etude chez des eleves d'une ecole romaine. In: Giordan, A., Martinand, J.L.(Hrsg): Education scientifique et vie quotidienne, 1988, 193-199
G6;B

OKEKE, E.A.C., WOOD-ROBINSON, C.: A Study of Nigerian pupils' understanding of selected biological concepts. Journal of Biological Education 14(4), 1980, 329-338
G6;B

PROUT, A.: Science, health and everyday knowledge: A case study about the common cold. European Journal of Science Education 7, 1985, 399-406
G6;B

RICE, P., GUNSTONE, R.: Health and sickness causation and the influence of Thai culture among Thai schoolchildren. Research in Science Education, 16, 1986, 63-72
G6;B

ROTH, K.J., SMITH, E.L., ANDERSON, C.W.: Student's Conceptions of Photosynthesis and Food for Plants. Paper presented at the annual meeting of the AERA, Montreal, 1983
G6;B

SANFORD, J.P., SCHMIDT FRENCH, B.: Teaching and Learning Genetics: A Case Studies of Academic Work in Two Classrooms. Paper presented at the annual meeting of the American Education Research Association, San Francisco, April 1986
G6;G7;B
SCHAEFER, G.: Concept Formation in Biology: The Concept "Growth". In: European Journal of Science Education 1 (1), 1979, 87-101
G6;B
SCHAEFER, G.: The Concept of "Health" and "Environment" in Future Biology Teaching. Proceedings of the Eighth Biennial Conference of AABE, 1980
G6;B
SCHAEFER, G.: Der Begriff Ökosystem in den Köpfen von Schülern und Lehrern. Verhandlungen der Gesellschaft für Ökologie. Band XI, 1983, 361-369
G6;G8;B
SCHAEFER, G.: Empirical Studies on Concept Formation. The Concept of "Energy" and "Health" in West-German Schools. University of Hamburg
G6;P;B;EN
SIMPSON, M., ARNOLD , B.: The Inappropriate Use of Subsumers in Biology Learning. In: European Journal of Research in Science Education 4 (2), 1982, 173-182
G6;B
SUBBARINI, M.S.: Misconception About Evolution Among Secondary School Pupils in Kuwait. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 434-440
G6;B
SYMINGTON, D., BOUNDY, K., RADFORD, T., TAYLOR, B.: Prior Knowledge and Primary Pupils' Interaction with a Museum Display. Research in Science Education 16, 1986, 58-62
G6;B
TAMIR, P., GAL-CHOPPIN, R., NUSSINOVITZ, R.: How Do Intermediate and Junior High School Students Conceptualize Living and Nonliving? In: Journal of Research in Science Teaching 18 (3), 1981, 241-248
G6;B
TREAGUST, D.F., HASLAM, F.: Evaluating secondary student's misconceptions of photosynthesis and respiration in plants using a two-tier diagnostic instrument. Paper presented at the 59th Annual Meeting of the National Association for Research in Science Teaching, San Francisco, California, 1986
G6;B
WANDERSEE, J.H.: Students' Misconceptions About Photosynthesis: A Cross-Age Study. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 441-466
G6;B

G8 UNTERSUCHUNGEN ZU VORSTELLUNGEN

INVESTIGATIONS OF NOTIONS

Sonstige others

AMER, C.: Common Sense Answers in Physics. In: Research in Science Education 16, 1986, 31-39
G6;G8
ANDERSON, R.D.: Children's Ability to Formulate Mental Models to Explain Natural Phenomena. In: Journal of Research in Science Teaching 3, 1965, 326-332
G8
ANDERSSON, B.R., RENSTROM, L.: How Swedish Pupils, Age 12-15, Explain the "Exhaust" Problem. Leeds-Göteborg Study. Pupils' Content Oriented Reasoning in Science, Working Paper 2, EKNA-project 1982. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1982
G8
ANDERSSON, B.R., RENSTROM, L.: How Swedish Pupils, Age 12-15, Explain the "Aspirin" Problem. Leeds-Göteborg Study. Pupils' Content Oriented Reasoning in Science, Working Paper 3, EKNA-project 1982. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1982
G8
ANDERSSON, B.R., RENSTROM, L.: How Swedish Pupils, Age 12-15, Explain "The Sugar in Water" Problem. Leeds-Göteborg Study. Pupils' Content Oriented Reasoning in Science, Working Paper 1, EKNA-project 1982. Department of Education and Educational Research, University of Gothenburg. Mölndal, 1982
G8
ANDERSSON, B.R.: Science Teaching and the Development of Thinking: Development of concrete operational thinking and of language resulting from the SCIS/LMN special concepts unit "Relativity of Position and Motion". Doctoral thesis. Acta Universitatis Gothoburgensis, Gothenburg 8, Sweden, 1976
G8
ANDERSSON, B.R.: Pupils' Thinking and Course Requirements in Science Teaching (EKNA). Newsletter, School Research, 1980, 1
G8
BLEICHROTH, W.: Zur Entwicklung des physikalischen Denkens im Volksschulalter. In: Zeitschrift für Naturlehre und Naturkunde 5, 1957, 234-239
G8
BLISS, J.: Ideas of Chance and Probability in Children and Adolescents. In: Physics Education 13, 1978, 408-413
G8;STAT;IBB
BORN, G., WEBER, R.: Umgangssprachliche Verwendung physikalischer Begriffe. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1976. Gießen: I. Physikalisches Institut, 1976, 280-286
G4;G8
BOYD, C.A.: A Study of Unfounded Beliefs. In: Science Education 50, 1966, 396-398
G8
CAUZINILLE-MARMECHE, E., MEHEUT, M., SERE, M.-G., WEIL-BARAIS, A. The Influence of a priori Ideas on the Experimental Approach. Science Education 69, 1985, 201-211
G8
CLEMENT, J.: The Role of Analogy in Scientific Thinking: Examples from a Problem-Solving Interview. Department of Physics and Astronomy University of Massachusetts, Amherst, Mass. Working Paper, 1978
G8

DAHLGREN, L.O., MARTON, F.: Student Conceptions of Subject Matter. In: Studies in Higher Education 3 (7), 1978, 25-35
G8
DELUCA, F.P.: Application and Analysis of an Electronic Equivalent of Piaget's First Chemical Experiment. In: Journal of Research in Science Teaching 16, 1979, 1-11
G8
DENNIS, W.: Animistic Thinking Among College and High School Students in the Near East. In: Journal of Educational Psychology 48, 1957, 193-198
G8
DORAN, R.L.: Misconceptions of Selected Science Concepts. In: Journal of Research in Science Teaching 9, 1972, 127-137
G8
DRIVER, R., EASLEY, J.: Pupils and Paradigms: A Review of Literature Related to Concept Development in Adolescent Science Students. In: Studies in Science Education 5, 1978, 61-84
G1;G8
DRIVER, R., GUESNE, E., TIBERGHIEN, A.: Children's ideas in science. Milton Keynes, Philadelphia: Open University Press, 1985
G1;G8,G7
DRIVER, R.: Pupils' Alternative Frameworks in Science. In: European Journal of Science Education 3 (1), 1981, 93-101
G1;G8
FINLEY, F.N.: Variations in Prior Knowledge. Science Teaching Center, Department of Curriculum and Instruction, University of Maryland, College Park, Maryland 20742
G8
GARNETT, P. , TOBIN, K., SWINGLER, D.G.: Reasoning abilities of secondary school students aged 13-16 and implications for the teaching of science. European Journal of Science Education 7, 1985, 387-397
G8
GATES, L., JAY, B.: Children Understanding of "All" and "Some". In: Science Education 62 (3), 1978, 359-363
G8
GILBERT, J.K., OSBORNE, R.J., FENSHAM, P.J.: Children's Science and its Consequences for Teaching. In: Science Education 66 (4), 1982, 623-633
G1;G8
GIORDAN, A.: Bibliographie concernant les recherches sur les conceptions des apprenants en Biologie. Annales de didactique des sciences No 2, BIODIC LDES 1987
G1;G8
GRAHAM, I.: Difficulties encountered by biology students in understanding and applying the mole concept. Journal of Biological Education, 17, 4, 1983, 339-342
G8
GRIFFITHS, K.M.: An Investigation into the Development of Concepts. Paper presented at the "Cognitive Development Research Seminar, Science and Mathematics Education", Leeds, September 1979
G8
HAGSTEDT, H., SPRECKELSEN, K.: Wie Kinder physikalischen Phänomenen begegnen. SMP 14, Nr. 8, 1986, 318-323
G5;G8
HALLDEN, O.: Teachers' Questions and Pupils Problems: A Commentary. In: European Journal of Science Education 5 (3), 1983, 333-336
G8

HAPPS, J.C.: Regression in learning outcomes: Some examples from the earth sciences. European Journal of Science Education 7, 1985, 431-443
G8

HAPPS, J.C.: Cognitive Learning Theory and Classroom Complexity. Research in Science & Technological Education, Vol. 3, No. 2, 1985, 159-174
G8;G7

HARLEN, W.: The Development of Scientific Concepts in Young Children. In: Educational Research 11, 1968, 4-13
G8

HEEPMANN, B.: "Kinder auf dem Wege zur Physik". Ein Versuch zur Gewinnung von Aufschlüssen über das kindliche Denken in verschiedenen Altersstufen aufgrund von Schüleräußerungen. I und II. In: Zeitschrift für Naturlehre und Naturkunde 16,1968, 265-268, 313-318
G8

HELM, H., NOVAK, J.D. (EDS.): Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983
G1;G8

HILL, D., REDDEN, M.G.: An Investigation of the System Concept. School Science and Mathematics, 1985, 233-239
G8

HUANG, J.: Childrens Explanations of Strange Phenomena. In: Smith College Studies in Psychology 1. Northampton, 1930, 63-101
G8

HUANG, J.: Children's Conception of Physical Causality: A Critical Summary. In: Journal of Genetic Psychology 63, 1943, 71-121
G8

INBODY, D.: Childrens Understandings of Natural Phenomena. In: Science Education 47, 1963, 270-278
G8

INHELDER, B.: The Development of the Concepts of Chance and Probability in Children. In: OVERTON, W., McCARTHY GALLAGHER, J. (Eds.): Knowledge and Development. New York, Plenum Press, 1977, 43-57
G8;STAT;IBB

JAIDE, W.: Über die Entwicklung des kindlichen Verständnisses für Natur und Technik. In: Schule und Psychologie 1, 1954, 78-88
G8

JAIDE, W.: Das kindliche Verständnis für Natur und Technik. In: Neue Deutsche Schule 7, 1955, 284-287
G8

JOHNSON, C.N., WELLMAN, H.M.: Children's Developing Conceptions of the Mind and Brain. Child Development, 53, 1982, 222-234
G8

KARMILOFF-SMITH, A., INHELDER, B.: "If you want to get ahead, get a theory". Cognition 3(3), 1974/75, 195-212
G8

KING, W.H.: The Development of Scientific Concepts in Children. In: British Journal of Educational Psychology 31, 1961, 1-20
G8

KING, W.H.: The Development of Scientific Concepts in Children. In: GORDON, I.J. (Ed.): Human Development (Readings in Research). Chicago, Ill.: Scott Foresman, 1965
G8

KUETHE, L.J.: Science Concepts: A Study of "Sophisticated" Errors. In: Science Education 47, 1963, 361-364
G8

KUHN, D., PHELPS, H.: The Development of Children's Comprehension of Causal Direction. In: Child Development 47, 1976, 248-251
G8

LINN, M.C.: Theoretical and Practical Significance of Formal Thought: Some Considerations. Paper presented at the Society for Research in Child Development Meeting. San Francisco, California. March 1979
G1,G8

LINN, M.C.: When Do Adolescents Reason ? In: European Journal of Science Education 2 (4), 1980, 429-440
G1,G8

LOVELL, K.: The Growth of Basic Mathematical and Scientific Concepts in Children. London: University of London Press, 1966
G8

LOVELL, K.: Das Wachsen des naturwissenschaftlichen Verständnisses im Kinde. In: Der Physikunterricht 12 (4), 1978, 58-81
G8

LYBECK, L.: Om didaktisk kunskapsbildning i matematik och naturvetenskapliga ämnen. In: Marton, F.(red.): Fackdidaktik, Vol. 3 Matematik, Naturorienterande ämnen
G8

LYBECK, L.: Studien über Mathematik im naturwissenschaftlichen Unterricht. In: physica didactica 6 (1), 1979, 35-65
G8

LYBECK, L.: Arkimedes i klassen. Acta Universitatis Gothoburgensis
G8

LYNCH, P.P. ET AL.: Scientific Language and the High School Pupil. In: Journal of Research in Science Teaching 16 (4), 1979, 351-357
G8

LYNCH, P.P., CHIPMAN, H.H., PACHAURY, A.C.: The Language of Science and the High School Student: The Recognition of Concept Definitions. Journal of Science and Mathematics Education in S.E. Asia, 15, No. 2, 1984, 7-14
G4,G8

MATTHEWS, G.P., BROOK, V.G., ELLIOT, G.B., KAHN-GANDAPUR, T.H.: Cognitive Structure Determination as a Tool in Science Teaching. Part 3. Results. European Journal of Science Education 7, 1985, 263-279
G5,G8

MAYER, M.: La technologie employee dans la vie quotidienne. Influence-t-elle les conceptions spontanees des etudiants? In: Giordan, A., Martinand, J.-L.(Hrsg.): Education scientifique et vie quotidienne, 1988, 481-488
G1,G8

MBIGIL, K.S.: Selected Science Misconceptions Amongst Some Nigerian School Certificate Students. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 455-457
G8

MILKENT, M.: Comment on "Science Misconceptions Among Certain Groups of Students in Lebanon". In: Journal of Research in Science Teaching 13, 1976, 571-572
G8

MOTHES, H.: Wie werden Naturerscheinungen vom Kinde selbst gedeutet ? In: Zeitschrift für Naturlehre und Naturkunde 4, 1956, 64-67
G1,G8

MURPHY, P., SCHOFIELD, B.: Science at Age 13. Assessment of Performance Unit. Science Report for Teachers 3. Leeds, 1984
G8

OAKES, M.E.: Children's explanations of natural phenomena. Teachers college, Columbia University, Contributions to education, No. 926, New York 1947
G1;G8

OLSTAD, R.G., HAURY, D.L.: A Summary of Research in Science Education - 1982, "Conceptual Understanding". In: Science Education 68, 1984, 219-222, 316-363
G1;G8

PIAGET, J., INHELDER, B.: Die Entwicklung der physikalischen Mengenbegriffe beim Kinde. Stuttgart: Klett, 1969
G8

PIAGET, J., INHELDER, B.: The Origin of the Idea of Chance in Children. London: Routledge & Kegan Paul, 1975
G8;STAT;I88

PIAGET, J.: The Childs Conception of Physical Causality. London: Kegan Paul, 1930
G8

PREECE, P.F.W.: Associative Structure and the Schema of Proportionality. Journal of Research in Science Teaching 15, 1978, 395-398
G8

RASPE, C.: Kindliche Selbstbeobachtung und Theoriebildung. In: Zeitschrift für angewandte Psychologie 23, 1924, 302-328
G8

ROGERS, W.P.: What Do Children Believe? In: Science Education 45, 1961, 133-137
G8

SCHULTE, W.: Zur Bedeutung der Sprache im Physikunterricht. Untersuchungen über den Einfluß des Unterrichts auf das Verständnis physikalischer Termini. Diplomarbeit, Göttingen, 1980
G4;G8

SCHWANEBERG, R., HEEGE, R.: Beziehungsdenken und Dingdenken. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1981. Gießen: 1.Physikalisches Institut, 1981
G8

SCRIVEN, E.G.: An Analysis of Types of Concepts Used by Fourth through Ninth Graders in Written Explanations of Scientific Terms. Thesis. Cornell University, Ithaca, N.Y., 1967
G8

SIEGLER, R.S.: The Effects of Simple Necessity and Sufficiency Relationship on Children's Causal Interferences. In: Child Development 47, 1976, 1058-1063
G8

SNEIDER, C., KURLICH, K., PULOS, S., FRIEDMAN, A.: Learning to control Variables with Model Rockets: a Neo-Piagetian Study of Learning in Field Settings. Science Education 68, 1984, 463-484
G8

SPRECKELSEN, K.: Wie Grundschüler sich physikalische Phänomene erschließen In: Nikolakis, N. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge der GDCP Tagung 1988. Alsbach: Leuchtturm, 1989, 283-285
G8

STAVY, R.: Teaching Inverse Functions via the Concentration of Salt Water Solution. Archives de Psychologie, 1981, 267-287
G8

STEVENS,A.L., COLLINS, A.: Multible Conceptual Models of a Complex System. Cambridge, Mass. 1978
G8

SUTTON, C., WEST, L.: Investigating Children's Existing Ideas About Science. A research seminar, April 1982
G1;G8

VIENNOT, L.: Common Practice in Elementary Algebra. In: Journal of Research in Science Teaching 3, 1981, 183-194
G6

ZA'ROUR, G.I.: Science Misconceptions Among Certain Groups of Students in Lebanon. In: Journal of Research in Science Teaching 12, 1975, 385-391
G6

ZA'ROUR, G.I.: Interpretation of Natural Phenomena by Lebanese School Children. In: Science Education 60 (2), 1976, 277-287
G6

ZIETZ, K.: Die Physik des Kindes. In: Die Deutsche Schule 40, 1936, 263-269
G1;G6

ZIETZ, K.: Kindliche Erklärungsversuche für Naturerscheinungen. In: Zeitschrift für pädagogische Psychologie 38, 1937, 219-228
G6

ZIETZ, K.: Zur Entwicklung des kausalen Denkens bei Kindern. In: Zeitschrift für angewandte Psychologie und Charakterkunde 57, 1939, 50-68
G1;G6

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P - Bereich der Physik	Area of physics
E - Elektrizität	- electricity

AALST, H. V.: The Differentiation Between Connections in Series and in Parallel from Cognitive Mapping: Implications for Teaching. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 115-128
G6;G7;P;E

CLOSSET, J.L.: Using Cognitive Conflict to Teach Electricity. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 267-273
G7;P;E

COHEN, R.: Causal Relations in Electric Circuits: Students' Concepts. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 107-113
G6;G7;P;E

COSGROVE, M., OSBORNE, R.J., CARR, M.: Using Practical Technological Problems to Promote Conceptual Change. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 257-266
G7;P;E

COSGROVE, M., OSBORNE, R., CARR, M.: Childrens' Intuitive Ideas on Electric Current and the Modification of These Ideas. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 247-256
G6;G7;P;E

COSGROVE, M., OSBORNE, R.J.: A Teaching Sequence on Electric Current. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. 1985, 112-123
G7;P;E

DUIT, R., JUNG, W., RHÖNECK, C. V.: Understanding and teaching electricity - a guide to the workshop's papers. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 9-30
G5;G6;G7;P;E

DUIT, R., JUNG, W., RHÖNECK, C. V. (ED.): Aspects of Understanding Electricity. Proceedings of an International Workshop in Ludwigsburg, Sept. 1984 IPN Arbeitsberichte 60. Kiel: IPN/Schmidt & Klaunig, 1985
G6;G7;P;E

DUPIN, J.J., JOHSUA, S.: Teaching Electricity: Interactive Evolution of Representations, Models and Experiments in a Class Situation. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 331-341
G7;P;E

GAULD, C.F.: Teaching about Electric Circuits. Working Paper. Science Education Research Unit. University of Waikato, 1985, 1-37
G7;P;E

GOHMERT, B., SCHILLING, P.: Geschlossene Wasserkreise - Modell für elektrische Stromkreise? Darstellung einer spielorientierten Unterrichtseinheit. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der Frühjahrstagung 1983. Gießen: I.Physikalisches Institut, 1983, 270-275
G7;P;E

HAUKE, B.: Ein an Schülervorstellungen orientierter Einstieg in die Elektrostatik. In: Naturwissenschaften im Unterricht - Physik/Chemie 29 (3), 1981, 103-109
G6;G7;P;E

HARTEL, H.: The Electric Circuit as a System. In: DUIT, R., JUNG, W., RHÖNECK, C.
v. (Eds.): Understanding Electricity – Proceedings of a Workshop. Pädagogische
Hochschule Ludwigsburg, 1986
G7;P;E

JOSHUA, S., DUPIN, J.-J.: Is the systematization of hypothetico-deductive
reasoning possible in a class situation? European Journal of Science Education,
Vol. 8, No. 4, 1986, 381-388
G7;P;E

JUNG, W., MAICHLE, U., WEBER, E., WIESNER, H.: Probleme der Einführung
elektrischer Grundbegriffe in der Sekundarstufe I. In: DAHNCKE, H. (Hrsg.): Zur
Didaktik der Physik und Chemie. Hannover: Schroedel, 1977, 60-62 und
In: Naturwissenschaften im Unterricht – Physik/Chemie 26, 1978, 137-145
G7;P;E

JUNG, W., WIESNER, H., KIOWSKI, I., WEBER, E.: Zum Anfangsunterricht in der
Elektrizitätslehre. In: physica didactica 9, 1982, 267-272
G6;G7;P;E

JUNG, W.: Elementary Electricity: An Epistemological Look at Some Empirical
Results. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Eds.): Understanding
Electricity – Proceedings of a Workshop. Pädagogische Hochschule Ludwigsburg.
1986
G1;G7;P;E

LICHT, P.: Concept Development in Electricity: A Strategy and some provisional
Results. Paper prepared for the International Symposium on Physics Teaching.
Universite Libre de Bruxelles, Nov 11-15, 1986
G6;G7;P;E

MCDERMOTT, L.C., ZEE, E. V.: Identifying and Adressing Student Difficulties With
Electric Circuits. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of
Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 39-48
G6;G7;P;E

SCHWEDES, H.: Zur Kontinuitätsvorstellung bei Wasserstromkreisen und elektrischen
Schaltungen. In: DPG-Fachausschuß Didaktik der Physik (Hrsg.): Vorträge der
Frühjahrstagung 1983. Gießen: I.Physikalisches Institut, 1983, 264-269
G6;G7;P;E

SHIPSTONE, D. , GUNSTONE, R.: Teaching Children to Discriminate Between Current
and Energy. In: DUIT, R., JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of
Understanding Electricity. Kiel: Schmidt & Klaunig, 1985, 287-297
G7;P;E

SHIPSTONE, D.: Electricity in Simple Circuits. In: Driver, R., Guesne, E.,
Tiberghien, A.(ed.): Children's Ideas in Science, 1985, 33-51
G6;G7;P;E

STEINBERG, M.S.: Construction of Causal Models: Experimenting with Capacitor
Controlled Transients as a means of Promoting Conceptual Change. In: DUIT, R.,
JUNG, W., RHÖNECK, C. v. (Ed.): Aspects of Understanding Electricity. Kiel:
Schmidt & Klaunig, 1985, 367-379
G7;P;E

STORK, E., WIESNER, H.: Schülervorstellungen zur Elektrizitätslehre und
Sachunterricht. Bericht über einen Versuch zur Integration von fachdidaktischer
Forschung und schulpraktischer Ausbildung an der Universität. In:
Sachunterricht und Mathematik in der Primarstufe 9, 1981, 218-230
G6;G7;P;E

TASKER, R., OSBORNE, R.J.: Science Teaching and Science Learning. In: Osborne,
R.J., Freyberg, P.: Learning in science. The implications of children's
science, 1985, 15-27
G6;G7;P;E

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P - Bereich der Physik	Area of physics
T - Wärme	- heat

ENGEL CLOUGH, E., DRIVER, R.: Secondary students' conceptions bringing together scientific and personal views. Physics Education 20, 1985, 176-182
G6;G7;P;T

ERICKSON, G., TIBERGHIEN, A.: Heat and Temperature. In: Driver, R., Guesne, E., Tiberghien, A. (ed.): Children's Ideas in Science
G6;G7;P;T

ERICKSON, G. : Student Frameworks and Classroom Instruction. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 489-500
G1;G7;B;P;T

ROSENQUIST, M., POPP, B.D., MCDERMOTT, L.C.: Helping Students Overcome Conceptual Difficulties with Heat and Temperature. Paper presented at the summer meeting of the American Association of Physics Teachers in Ashland, June 23, 1983
G7;P;T

STAVY, R., BERKOVITZ, B.: Cognitive Conflict as a Basis for Teaching Quantitative Aspect of the Concept of Temperature. In: Science Education 64 (5), 1980, 679-692
G6;G7;P;T

STAVY, R., STRAUSS, S.: Educational-Developmental Psychology and Curriculum Development: The Case Heat and Temperature. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 292-303
G6;G7;P;T

WIESNER, H.: Untersuchungen von Vorstellungen von Primarstufenschülern über Begriffe und Phänomene aus der Wärmelehre. In: MIKELSKIS, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie, 1984. Alsbach: Leuchtturm, 1985, 242-244
G6;G7;P;T

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P - Bereich der Physik   Area of physics
M - Mechanik   - mechanics

ARONS, A.B.: Thinking, Reasoning and Understanding in Introductory Physic Courses. The Physics Teacher, 1981, 166-172
G6;G7;P;M

CHAMPAGNE, A.B., GUNSTONE, R.F., KLOPFER, L.E.: Instructional Consequences of Students'Knowledge about Physical Phenomena. In: WEST, PINES (Ed): Cognitive Structure and Conceptual Change Orlando etc: Academic Press, 1985, 61-90
G1;G7;P;M

CHAMPAGNE, A.B., GUNSTONE, R.F., KLOPFER, L.E. Effecting Changes in Cognitive Structure among Physics Students. In: WEST, PINES (Ed): Cognitive Structure and Conceptual Change Orlando etc: Academic Press, 1985, 163-187
G1;G5,G6,G7;P;M

CHAMPAGNE, A.B., KLOPFER, L.E., ANDERSON, J.: Factors Influencing the Learning of Classical Mechanics. In: American Journal of Physics 48, 1980, 1074-1079
G1;G6,G7;M;P

CHAMPAGNE, A.B., KLOPFER, L.E.: Laws of Motion Programs. Learning Research and Development Center, University of Pittsburgh, PA 15260, 1982
G7;P;M

CHAMPAGNE, A.B., KLOPFER, L.E.: Laws of Motion: Computer-simulated Experiments in Mechanics. Teacher's Guide. New Rochelle, NY: Educational Materials and Equipment Co., 1982
G7;P;M

ENGELHARDT, P., WIESNER, H.: Lernschwierigkeiten in der Mechanik und unterrichtliche Konsequenzen. In: Der Physikunterricht 17 (1), 1983, 15-34
G7;P;M

GUNSTONE, R., WATTS, M.: Force and Motion. In: Driver, R., Guesne, E., Tiberghien, A. (ed.): Children's Ideas in Science
G6,G7;P;M

GUNSTONE, R. , CHAMPAGNE, A.B., KLOPFER, L.E.: Instruction for Understanding: A Case Study. In: The Australian Science Teachers Journal 27 (3), 1981, 27-32
G1;G7;P;M

HEWSON, M.G., HEWSON, P.W.: Effect of Instruction Using Students' Prior Knowledge and Conceptual Change Strategies in Science Learning. In: Journal of Research in Science Teaching 20 (8), 1983, 731-743
G6;G7;P;M

HEWSON, P.W.: Microcomputers and Conceptual Change: The Use of a Microcomputer Program to Diagnose and Remediate an Alternative Conception of Speed. Paper presented at the Annual Meeting of the American Educational Research Association. Montreal, April 1983
G5,G7;P;M

JUNG, W., CALLSEN, H.: Newtonsche Mechanik. Versuch eines neuen Zugangs für den Unterricht. In: Naturwissenschaften im Unterricht - Physik/Chemie 24, 1976, 231-236
G7;P;M

JUNG, W., REUL, H., SCHWEDES, H.: Untersuchungen zur Einführung in die Mechanik in den Klassen 3-6. Frankfurt/Main: Diesterweg, 1977
G1;G6,G7;P;M

JUNG, W., SCHWEDES, H.: Rechtzeitig lernen - Einführung in die Newtonsche Mechanik im 5. - 6. Schuljahr. In: Naturwissenschaften im Unterricht - Physik/Chemie 25, 1977, 225-234
G7;P;M

JUNG, W., WEBER, E., WIESNER, H.: Ein Versuch zur Einführung des Energiebegriffs. In: Der Physikunterricht 12 (3), 1978, 22-41
G7;P;M;EN

JUNG, W., WIESNER, H.: Zur Definition fachdidaktischer Probleme am Beispiel der Mechanik. In: physica didactica 6, 1979, 203-216
G6;G7;P;M

JUNG, W.: Wege in die Mechanik. In: physica didactica 4, 1977, 219-229
G7;P;M

JUNG, W.: Zur Einführung des Kraftbegriffs. In: physica didactica 4, 1977, 171-187
G7;P;M

MINSTRELL, J.: Explaining the "AT REST" condition of an object. The Physics Teacher, 1982, 10-14
G7;P;M

NACHTIGALL, D.: Misconceptions in Physics and a Strategy to overcome them. The many faces of teaching and learning mechanics ... Proceedings of a conference on physics education, Utrecht - The Netherlands, Aug. 1984
G6;G7;P;M

OSBORNE, R.J.: Building on children's intuitive ideas. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science, 1985, 41-50
G6;G7;P;M

SERE, M.G.: The Gaseous State. In: Driver, R., Guesne, E., Tiberghien, A.(ed.): Children's Ideas in Science, 1985, 105-123
G6;G7;P;M

SOLOMON, J.: How Children Learn About Energy or Does the First Law Come First? In: The School Science Review 63 (224), 1982, 415-422
G6;G7;P;M;EN

SOLOMON, J.: Learning About Energy: How Pupils Think in Two Domains. In: European Journal of Science Education 5 (1), 1983, 49-59
G6;G7;P;M;EN

TERRY, C., JONES, G.: Alternative frameworks: Newton's third law and conceptual change. European Journal of Science Education, Vol.8, No.3, 1986, 291-298
G6;G7;P;M

VAN DEN BERG, J., RAAT, J.: Problem Solving in Mechanics - An Experiment in Mechanics Teaching. In: LIJNSE, P. (Ed.): The Many Faces of Teaching and Learning Mechanics. Conference on Physics Education. Utrecht, 1985, 329-336
G6;G7;P;M

WHITE, B.: Designing Computer Games to Help Physics Students Understand Newton's Laws of Motion. Cognition and Instruction, 1984, 69-108
G7;P;M

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P	- Bereich der Physik	Area of physics
O	- Optik	- optics

ANDERSON, C.W., SMITH, E.L.: Children's Conceptions of Light and Color: Understanding the concept of unseen rays. Institute for Research on Teaching, Michigan State University, East Lansing, 1983
G6;G7;P;O

ANDERSON, C.W., SMITH, E.L.: Children's Preconceptions and Content-Area Textbooks. In: DUFFY, G., et al(Ed.): Comprehension Instruction: Perspectives and Suggestions. New York: Longman, 1983, 187-201
G6;G7;P;O;B

CLAUS, J., STORK, E., WIESNER, H.: Optik im Sachunterricht. Eine empirische Untersuchung zu Vorstellungen und Lernprozessen. Sachunterricht und Mathematik in der Primarstufe 10, 1982, 82-92
G6;G7;P;O

EATON, J.F., ANDERSON, C.W., SMITH, E.L.: Students' Misconceptions interfere with Science Learning: Case Studies of Fifth-Grade Students. The Elementary School Journal, Vol. 84, No. 4, 365-379, The University of Chicago 1984
G6;G7;P;O

ENGELHARDT, P., WIESNER, H.: Bericht über eine Einführung in die Optik in einer 7. Klasse. In: Kuhn, W. (Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1986 München. DPG Fachausschuß Didaktik der Physik, 1986, 239-243
G7;P;O

FEHER, E., RICE, K.: Shadow. Science and Children, 1986
G7,P;O

GOLDBERG, F.M., MCDERMOTT, L.C.: Student difficulties in understanding image formation by a plane mirror. The Physics Teacher 24, 8, 1986, 472-480
G6;G7;P;O

GUESNE, E.: Light. In: Children's ideas in science. Milton Keynes, Philadelphia. Open University Press, 1985,10-33
G6,G7;P;O

HOFFMANN, K., WIESNER, H.: Lassen sich Alltagsvorstellungen über optische Phänomene durch Unterricht wirksam korrigieren? In: physica didactica 9, 1982, 299-317
G6;G7,P;O

HOFFMANN, K., WIESNER, H.: Ein subjektivistischer Zugang zur Optik in der Sekundarstufe I. Bericht über einen Unterrichtsversuch zur Vermittlung der Sender-Empfänger-Vorstellung. In: Naturwissenschaften im Unterricht - Physik/Chemie 32, 1984, 7-11
G6,G7;P;O

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P - Bereich der Physik	Area of physics
AT - Atome / Teilchen	- atoms / particles

JUNG, W.: Zur Behandlung der Atomphysik in der Sekundarstufe. In: Naturwissenschaften im Unterricht - Physik/Chemie 19, 1971, 1-8
G7;P;AT

MARCUS, W., PFUNDT, H.: Die Entwicklung und Erhärtung der Hypothese vom diskontinuierlichen Aufbau der Stoffe. In: Der mathematische und naturwissenschaftliche, Unterricht 29 (8), 1976, 472-477
G7;C;P;AT

NUSSBAUM, J.: The Particulate Nature of Matter in the Gaseous Phase. In: Driver, R., Guesne, E., Tiberghien, A.(Ed.): Children's Ideas in Science
G6;G7;P;AT

PFUNDT, H.: Zur Einführung der Atomhypothese. In: WENINGER, J., PFUNDT, H. (Hrsg.): Atommodelle im naturwissenschaftlichen Unterricht, Bd.2, Weinheim: Beltz, 1978, 10-24
G7;C;P;AT

SCHOLLUM, B., OSBORNE, R.J.: Relating the new to the familiar. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science, 1985, 51-65
G6;G7;P;AT

WIGHTMAN, T., GREEN, P., SCOTT, P.: Children's learning in science project. The construction of meaning and conceptual change in classroom settings: Case studies on the particulate Nature of matter. Centre for Studies in Science and Mathematics Education, The University of Leeds, 1986
G6;G7;P;AT

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P	- Bereich der Physik	Area of physics
AS	- Astronomie	- astronomy

NUSSBAUM, J., SHARONI-DAGAN, N.: Changes in Second Grade Children's Preconceptions about the Earth as a Cosmic Body Resulting from a Short Series of Audio-Tutorial Lessons. Science Education 67, 1983, 99-114
G6;G7;P;AS

NUSSBAUM, J.: The Earth as a Cosmic Body. In: Driver, R., Guesne, E., Tiberghien, A.(Ed.): Children's Ideas in Science
G6;G7;P;AS

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P - Bereich der Physik — area of physics
EN - Energie — energy

BLACK, P., SOLOMON, J.: Life World and Science World: Pupils' Ideas About Energy. In: MARX, G. (Ed.): Entropy in the School. Proceedings of the 6th Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 1983, 43-61
G6;G7;P;EN;ENT

JUNG, W., WEBER, E., WIESNER, H.: Ein Versuch zur Einführung des Energiebegriffs. In: Der Physikunterricht 12 (3), 1978, 32-41
G7;P;M;EN

KIRKWOOD, V.M., CARR, M., BELL, B., MCCHESNEY, J., OSBORNE, R.J., SYMINGTON, D.: LISP (Energy): The Strategy and some preliminary findings. Science Education Research Unit, University of Waikato, Hamilton, N.Z.
G7;P;EN

SOLOMON, J.: How Children Learn About Energy or Does the First Law Come First? In: The School Science Review 63 (224), 1982, 415-422
G6;G7;P;M;EN

SOLOMON, J.: Learning About Energy: How Pupils Think in Two Domains. In: European Journal of Science Education 5 (1), 1983, 49-59
G6;G7;P;M;EN

SOLOMON, J.: Teaching the conservation of energy. Physics Education 20, 1985, 165-170
G6;G7;P;EN

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P	**- Bereich der Physik**	**Area of physics**
	- Sonstige	**- others**

ARONS, A.B.: Students Patterns of Thinking and Reasoning. Part 1, Part 2, Part 3 The Physics Teacher, 1983, 576-581; 1984, 21-26, 88-93
G7;P

BLACK, P., SOLOMON, J.: Life World and Science World: Pupils' Ideas About Energy. In: MARX, G. (Ed.): Entropy in the School. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 1983, 43-55
G6;G7,P;EN;ENT

ENNENBACH, W.: The Influence of Model-Instruction on "Conception- and Misconception Learning" in Biology and Physics. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 35-38
G7;B;P

FINEGOLD, M., REINER, M.: Student Learning Behaviors as a means for a cognitive Evaluation of a Physics Program. Studies in Educational Evaluation 11, 1985, 105-111
G7,P

MALONY, D.P.: Cognitive Physics Educational Research - a Bibliography Physics Department. Creighton University. Omaha, 1984
G1;G6;G7,P

VKGTING, P.: Education Based on a New Concept of Teaching in Physics. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. University of Leeds, 1980, 320-327
G7;P

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

C - Bereich der Chemie Area of chemistry

KRAUSE, H.: Wie deuten Kinder chemische Vorgänge ? In: Westermanns Pädagogische Beiträge 14, 1962, 360-366
G7;C

KRAUSE, H.: Von der Luft und dem Feuer. In: Westermanns Pädagogische Beiträge 16, 1964, 10-19
G7;C

KRAUSE, H.: Die Verbrennung der Metalle. In: Westermanns Pädagogische Beiträge 17, 1965, 1-16
G7;C

KRAUSE, H.: Die Verbrennung der Kohle. In: Westermanns Pädagogische Beiträge 18, 1966, 1-12
G7;C

KRAUSE, H.: Die Verbrennung der Kerze. In: Westermanns Pädagogische Beiträge 19, 1967, 1-16
G7;C

MARCUS, W., PFUNDT, H.: Die Entwicklung und Erhärtung der Hypothese vom diskontinuierlichen Aufbau der Stoffe. In: Der mathematische und naturwissenschaftliche Unterricht 28 (8), 1975, 472-477
G7;C;P;AT

PFUNDT, H.: Ursprüngliche Erklärungen der Schüler für chemische Vorgänge. In: Der mathematische und naturwissenschaftliche Unterricht 28, 1975, 157-162
G7;C

PFUNDT, H.: Zur Einführung der Atomhypothese. In: WENINGER, J., PFUNDT, H. (Hrsg.): Atommodelle im naturwissenschaftlichen Unterricht, Bd.2, Weinheim: Beltz, 1978, 10-24
G7;C;P;AT

VOORDE, H.H. ten.: Education Based on a New Concept of Teaching in Chemistry. In: ARCHENHOLD et al. (Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings of an International Seminar. The University of Leeds, 1980, 310-319
G4;G7;C

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

B - Bereich der Biologie Area of biology

ANDERSON, C.W., SHELDON, T., DUBAY, J.: The Effects of Instruction of College Non-Majors' Conceptions of Respiration and Photosynthesis. Paper presented at the annual meeting of AERA, Chicago, April 1988
G7;B

ANDERSON, C.W., SMITH, E.L.: Children's Preconceptions and Content-Area Textbooks. In:DUFFY, G., et al(Ed.): Comprehension Instruction: Perspectives and Suggestions. New York: Longman, 1983, 187-201
G6;G7;P;O;B

BELL, B., FREYBERG, P.: Language in the science classroom. In: Osborne, R., Freyberg, P.: Learning in science; The implications of children's science, 1985, 29-40
G4;G6;G7;B

ENNENBACH, W.: The Influence of Model-Instruction on "Conception- and Misconception Learning" in Biology and Physics. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 32-38
G7;B;P

ERICKSON, G. : Student Frameworks and Classroom Instruction. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 489-500
G1;G7;B;P;T

GIORDAN, A.: Learning process (and obstacles thereto) of science pupils aged 6-14. Council of Europe. Council for cultural co-operation. Educational research workshop on science in prim. educ., Edinburgh, Sept. 1984
G6;G7;B

KINNEAR, J.: Identification of Misconceptions in Genetics and the Use of Computer Simulations in Their Correction. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 84-92
G6;G7;B

SANFORD, J.P., SCHMIDT FRENCH, B.: Teaching and Learning Genetics: A Case Studies of Academic Work in Two Classrooms. Paper presented at the annual meeting of the American Education Research Association, San Francisco, April 1986
G6;G7;B

G7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

Sonstige others

ABDELJABBAR, M.: Quelle methodologie d'identification des representations des eleves dans le contexte extra-scolaire et scolaire. In: Giordan, A., Martinand, J.-L.(Hrsg.): Feuilles d'epistemologie appliquee et de didactique des sciences 8, 1986,33-38
G7

ARNAUDIN, M.W., MINTZES, J.J., DUNN, C.S., SHAFER, T.: Concept Mapping in College Science Teaching. Journal of College Science Teaching
G7

BRADY, C.: Science Teaching and the Development of Scientific Concepts in Children. In: School Science Review 51, 1970, 765-770
G7

CLEARE, C.: Using Concept Mapping to Detect Interventions Effective in Improving Pre-Service Elementary Educ. Majors' Understanding of Science Topics. In: Proceedings of the International Seminar - Misconceptions in Science and Mathematics. Cornell University, Ithaca, N.Y., 1983, 137-140
G7

CLEMENT, J.: Analogy Generation in Scientific Problem Solving. Proceedings of the Third Annual Meeting of the Cognitive Science Society, 1981
G1,G7

COSGROVE, M., OSBORNE, R.J.: Lesson frameworks for changing children's ideas In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science
G1,G7

DEKKERS, J., MALONE, J.: The Concept Map as an Aid to Introduktion in Science and Mathematics. Science and Mathematics Education Centre, Western Australia, Bentley, 1982
G1,G7

DI SESSA, A.A.: Knowledge in Pieces. Graduate School of Education, University of California, Berkeley, Sept. 24, 1985
G1,G7

DRIVER, R., GUESNE, E., TIBERGHIEN, A.: Children's ideas in science. Milton Keynes, Philadelphia: Open University Press, 1985
G1,G6,G7

DRIVER, R., GUESNE, E., TIBERGHIEN, A.: Some Features of Children's Ideas and their Implications for Teaching. In: Driver, R., Guesne, E., Tiberghien, A.(ed.): Children's Ideas in Science, 1985, 193-201
G1,G7

DRIVER, R., GUESNE, E., TIBERGHIEN, A.: Children's Ideas and the learning of Science. In: Driver, R., Guesne, E., Tiberghien, A.(ed.): Children's Ideas in Science, 1985, 1-9
G1,G7

DRIVER, R.: The approach of the children's learning in science project. Annual Meeting of the American Educational Research Association, San Francisco, 1986
G1,G7

FREYBERG, P., OSBORNE, R.J.: Assumptions about Teaching and Learning. In: Osborne, R., Freyberg, P.: Learning in scienc. The implications of children's science, 1985, 82-90
G1,G7

GRIFFITHS, A.K., THOMEY, K., COOKE, B., NORMORE, G.: Remediation of student-specific misconceptions relating to three science concepts. Department of Curriculum and Instructions, Memorial University of Newfoundland, St. John's, Newfoundland, Canada, 1988
G7

GRIMELLINI TOMASINI, N., PECORI BALANDI, B.: Pupils' Conceptions: Some Implications for Teachers Training. In: Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 1983, 479-489
G7

GUNSTONE, R., NORTHFIELD, J. : Learners - Teachers - Researchers: Consistency in Implementing Conceptual Change. Paper presented at the meeting of the American Educational Research Association, San Francisco, April, 1986
G1;G7

HAPPS, J.C.: Cognitive Learning Theory and Classroom Complexity. Research in Science & Technological Education, Vol. 3, No. 2, 1985, 159-176
G8;G7

HENNINGSEN, J.: Wer lehrt, popularisiert. In: HENNINGSEN, J.: Kommunikation zwischen Fußnote und Feuilleton. Weinheim: Beltz, 1972, 68-73
G7

HEWSON, M.G., KRIEL, J.R., ZIETSMAN, A.I.: The Restructuring of Classical Textbook Knowledge for Problem Solving: A Conceptual Change Approach. National Institute for Personnel Research, Johannesburg, 1986
G7

HÄUSLING, A.: Was heißt eigentlich Sachlernen? GSP 14, Nr. 7, 1986
G1;G4;G7

JUNG, W.: Alltagsvorstellungen und das Lernen von Physik und Chemie. In: Duit, R., Jung, W., Rhöneck, Ch. v. (Hrsg.): Alltagsvorstellungen. Naturwissenschaften im Unterricht Physik/Chemie 34, April 1986, 2-6
G1;G7

KLIMA, E.: Methoden und Ergebnisse der Analyse von Lernzielsequenzen im naturwissenschaftlichen Unterricht. In: DAHNCKE, H. (Hrsg.): Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 1976, 168-178
G7

KLOPFER, L.E.: Intelligent Tutoring Systems in Science Education. The Coming Generation of Computer-Based Instructional Programs. Journal of Computers in Mathematics and Science Teaching Vol. 5, No. 4, 1986
G1;G7

LINN, M.C.: Learning-more with Computers as Lab Partners. University of California, Berkeley, San Francisco, 1986
G7;T

LOCHHEAD, J.: Beyond Emile - Misconceptions for Education in the twenty-first century. Paper presented at the AERA Meeting, Montreal, 1983
G1;G7

MILKENT, M. : It's Time We Started Paying Attention to What Students Don't Know. In: Science Education 61, 1977, 409-413
G7

MITCHELL, F., BAIRD, J.: Teaching, Learning and the Curriculum: The Influence of Content in Science. Research in Science Education 16, 1986, 141-149
G7

NORTHFIELD, J., GUNSTONE, R.: Understanding learning at the classroom level. Research in Science Education 15, 1985, 18-27
G1;G7

NOVAK, J.D., SYMINGTON, D.: Concept Mapping for Curriculum Development. V.I.E.R. Bulletin 48, June 1982, 3-11
G1;G7

NUSSBAUM, J., NOVICK, S.: Brainstorming in the Classroom to Invent a Model: A
Case Study. In: School Science Review 62 (221), 1981, 771-778
G7

OSBORNE, R.J., FREYBERG, P.: Roles for the Science Teacher. In: Osborne, R.,
Freyberg, P.: Learning in Science. The implications of children's science,
1985, 91-99
G1;G7

OSBORNE, R.J., TASKER, R.: Introducing Children's Ideas to Teachers. Osborne, R.,
Freyberg, P.: Learning in science. The implications of children's science,
1985, 136-148
G1;G7

OSBORNE, R.J.: Childrens' Dynamics. In: The Physics Teacher, 1984, 504-508
G7;M

PEARD, T.L.: The Microcomputer in Cognitive Development Research. In: Proceedings
of the International Seminar - Misconceptions in Science and Mathematics.
Cornell University, Ithaca, N.Y., 1983, 112-138
G7

ROWELL, J.A., DAWSON, C.J.: Equilibration, conflict and instruction: A new
class-oriented perspective. European Journal of Science Education 7, 1985,
331-344
G1;G7

TASKER, R., FREYBERG, P.: Facing the mismatches in the classroom. In: Osborne,
R.J., Freyberg, P.: Learning in science. The implications of children's
science, 1985, 66-80
G1;G7

THIEL, S.: Grundschulkinder zwischen Umgangserfahrung und Naturwissenschaft. In:
WAGENSCHEIN, M., BANHOLZER, A., THIEL, S.: Kinder auf dem Weg zur Physik.
Stuttgart: Klett, 1973, 90-179
G7

THIEL, S.: Kinder sprechen über Naturphänomene. In: Die Grundschule, Juli 1970
G7

THIEL, S.: Modellvorstellung und Wirklichkeit. In: Neue Sammlung 11, 1971,
608-617
G7

WEST, L.H.T.: Concept Mapping. Paper prepared for a symposium: Perspectives on
Cognitive Structure and Conceptual Change, at the 1985 AERA Annual Meeting,
Chicago, 1985
G5;G7

WIERSTRA, R.F.A.: Psychological Theories and Research Methods Relating to Pupils'
Mental Structures as Aids in Designing a Curriculum. In: ASCHENHOLD et al.
(Ed.): Cognitive Development-Research in Science and Mathematics. Proceedings
of an International Seminar. University of Leeds, 1980, 377-381
G7

G8 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON LEHRERN

INVESTIGATIONS OF TEACHERS' NOTIONS

Untersuchungen zu Vorstellungen von Lehrern werden erst seit Anfang 1987 mit einem eigenen Schlagwort (G8) versehen (vlg. Einführung).

Investigations of teachers' notions are given the keyword G8 only since the beginning of 1987 (see introduction).

AMEH, C., GUNSTONE, R.: Teachers' Concepts in Science. Research in Science Education 16. Australian Science Education Research Association, 1986, 151-157
G6,G8,P,M,E,B

AMEH, C., GUNSTONE, R.: Science Teachers' concepts in Nigeria and Australia. In: Research in Science Education 16, 1986, 73-81
G6,G8,P,E,M,B

AMEH, C.: Common Sense Answers in Physics. In: Research in Science Education 16, 1986, 31-39
G6,G8

LAWRENZ, F.: Misconceptions of Physical Science Concepts Among Elementary School Teachers. School Science and Mathematics Volume 86(8), Dezember 1986
G8

SCHAEFER, G.: Der Begriff Ökosystem in den Köpfen von Schülern und Lehrern. Verhandlungen der Gesellschaft für Ökologie. Band XI, 1983, 351-359
G6,G8,B

APPENDIX

BIBLIOGRAPHIE TEIL II

Dieser zweite Teil der Bibliographie enthält ca. 300 Artikel, die seit Anfang 1988 aufgenommen worden sind.

BIBLIOGRAPHY PART II

This part of the bibliography contains some 300 articles entered since the beginning of 1988.

g1 ZUM UMFELD DES PROBLEMS "VORSTELLUNGEN DER SCHÜLER"

GENERAL CONSIDERATIONS CONCERNING RESEARCH IN THIS AREA

Adey, P.: A response to "Towards a Lakatosian analysis of Piagetian and alternative conceptions research programs". Science Education 71, 1, 1987, 5-7
g1

Anderson, W.C., Belt, B.L., Gamalski, J.M., Greminger, J.E.: A social constructivist analysis of classroom science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 11-24
g1,g6,g9

Ault, C.: Interview studies in teacher education: examples from extraordinary contexts. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 25-29
g1,g6,P,O,B

Ault, C.R.: Children's intelligently wrong grasp of unobvious meaning. Paper submitted to Science Education, 1983, 1-17
g1

Baird, J., Mitchell, I.: Improving the quality of teaching and learning - an Australian case study. Melbourne: The Monash University Printery, 1986
g1,g6,g8,g9,CTL

Barbour, B.: Theories of learning: Pask. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 1984, 42-63
g1

Benson, G.D.: Open-endness in the empirical analytic mode: one conception of scientific progress. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 59-66
g1,g6,g8,CSC

Blosser, P.: Secondary school students' comprehension of science concepts: some findings from misconceptions research. ERIC/SMEAC Education Digest, 2, 1987
g1

Champagne, A.B.: Science teacher quality: a cognitive perspective. Paper prepared for the Seminar "Improving Teacher Quality in Science and Mathematics", Annual Meeting of AERA, San Francisco, 1986, 1-29
g1

Coles, B.: Theory for teachers; theory for researchers: bridging the gap. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 1984, 97-112
g1

Confrey, J.: "Misconceptions" across subject matter: science, mathematics, programming. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 81-106
g1

Driver, R.: Promoting conceptual change in classroom settings: the experience of the children's learning in science project. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 97-107
g1,g7

Duit, R.: Research on students' conceptions in science – perspectives from the Federal Republic of Germany. Paper presented at the Int. Seminar "Adolescent Development and School Science", Sept. 13-17th, King's College London, 1987, 1-23
g1

Duit, R.: Research on students' alternative frameworks in science – topics, theoretical frameworks, consequences for science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 151-162
g1

Duit, R.,: Comments on the papers presented at the symposium "Students' conceptions of subject matter content". In: Duit, R., SÄLJÖ, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 1988, 121-133
g1

Duit, R., SÄLJÖ, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2. European Conference on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 1988
g1

Eger, M.: Philosophy of science in teacher education. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 163-176
g1

Faucher, G.: Pragmatical conceptions in the atomic domain. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 137-142
g1

Fowler, T.W., Bou Jaoude, S.: Using hierarchial concept/proposition maps to plan instruction that addresses existing and potential student misunderstandings in science. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 182-186
g1.g7.g9

Gallagher, J.J.: A summary of research in science education – 1985; students' conceptual reasoning. Science Education 71, 3, 1987, 3o7-325
g1

Gil, P.D.: Differences entre "modeles spontanes", modeles enseignes et modeles scientifiques: quelques implications didactiques. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 118-121
g1.g7

Gil, P.D., Carracosa, A.J.: What to do for science misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 149-157
g1.g3

Gilbert, J.: Theories of learning: Kelly. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 1984, 19-41
g1

Giordan, A.: Les representations des eleves: outils pour la pedagogie. Cahiers Pedagogiques 214, 1983, 26-28
g1.g6.B

Giordan, A.: Des representations des eleves a l'appropriation de quelques concepts scientifiques. In: Giordan, A.: Reconstruire ses savoir. Paris: Messidor, 1985, 113-127
g1.g6.B

Giordan, A.: Premodeles et modeles (personelle et historiques) a propos du champ conceptuel de respiration. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 143-149
g1,g3,g6,B

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle, 1987
g1,g3,g5,g6,g7,P,C,B

Glynn, S., Britton, B.K., Semrud-Clikeman, M.: Analogical reasoning and problem solving in science textbooks. In: Glover, J.A., Ronning, R.R., Reynolds, C.R.: Handbook of creativity: assessment, research and theory. New York: Plenum, 1987
g1,g7

Gowin, D.B.: Changing the meaning of experience: empowering teachers and students trough vee diagrams and principles of educating to reduce misconceptions in science and mathematics, a mode of reform. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 233-240
g1

Hallden, O.: The concept of task as pupils' perceptions of teachers' assingments. Research Bulletins from the Institute of Education, University of Stockholm, Research in Progress Report XII:IV, 1986, 1-28
g1

Hartfree, W.E.: Misconceptions in science and mathematics - a view from Britain. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 241-244
g1

Hawkins, J., Pea, R.D.: Tools for bridging the cultures of everyday and scientific thinking. Journal of Research in Science Teaching 24, 4, 1987, 291-307
g1

Head, J.: Research into "alternative frameworks": promise and problems. Research in Science & Technological Education 4, 2, 1986, 203-211
g1

Hesse, J.J.: The costs and benefits of using conceptual change teachings methods: a teachers' perspective. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 194-210
g1,g8,CTL

Hills, G.L., McAndrews, B.: David Hawkins critical barriers and the education of elementary school science teachers. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 210-223
g1,g2,g9

Jordaan, A.S.: Aspects of the understanding and teaching of the laws of physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 258-267
g1

Kuhn, C., Aguirre, J.: A case study an the "journal method", a method designed to enable the implementation of constructivist teaching in the classroom. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 262-274
g1,g6,g7

Lippert, R.: Development of expert systems: an instructional strategy for dealing with misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 275-288
gl

Maloney, D.P.: Cognitive physics education research – a bibliography/2nd ed. Physics Department. Indiana University-Purdue University at Fort Wayne, 1987
gl

McNaught, C.: Science concept development in a developing country context. Paper presented at the Ass. of Sc. Ed. Annual Meeting, Cardiff, 1987
gl,g4

Niedderer, H.: A teaching strategy based on students' alternative frameworks-theoretical concepts and examples. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 360-367
gl,g7,P,B

Novak, J.: Proceedings of the 2. International Seminar "Misconceptions and Educational Strategies in Science and Mathematics",Vol. I – III. Ithaca: Cornell University, 1987
gl

Novak, J.D.: Human constructivism: toward a unity of psychological and epistemological meaning making. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 349-360
gl

Nussbaum, J., Giami, S.: The physics-chemical reduction of life: paradigm, biologists and human values. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 361-372
gl

Osborne, R., Gilbert, J. (Ed.): Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 1984
gl

Osborne, R.: Theories of learning: Wittrock. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 1984, 6-18
gl

Perkins, D.N., Simmons, R.: Patterns of misunderstanding: an integrative model of misconceptions in science, math and programming. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 381-395
gl

Pope, M., Gilbert, J.: Students' conceptions: themes and variations. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 1988, 88-120
gl,g5

Pope, M., Watts, M., Gilbert, J.: Constructive educational research. Paper presented at the 9th annual conference of the BERA, London, 1983
gl,g6

Richardson, M.: Teachers as learners: images from the past and implications of a (generative) constructivist perspective for the future. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 378-389
gl,g9

Ruth, C., Chaiklin, S.: Emerging consensus in novice physics problem solving research. Paper presented at the annual meeting of AERA, Washington D.C., 1987
g1

Säljö, R.: Students' conceptions of subject matter – a research perspective. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 1988, 136-140
g1

Sebastia, J.M.: Cognitive constraints and spontaneous interpretations in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 406-412
g1

Shuell, T.: Cognitive psychology and conceptual change: implications for teaching science. Science Education 71, 2, 1987, 239-260
g1

Simpson, M., Arnold, B.: Diagnostic tests and criterion-referenced assessment: their contribution to the resolution of pupil learning difficulties. Programmed Learning and Educational Technology 20, 1, 1983, 36-42
g1,g6,g7,B

Simpson, M.: Diagnostic assessment and its contribution to pupils' learning. In: Brown, S., Munn, P.: The changing face of education 14 to 16: curriculum and assessment. : NFER-Nelson, 1985, 69-81
g1,g7

Simpson, M.: Inside the secondary school classroom. Inspectorate Bulletin/Scottish Education Department, 1983
g1

Simpson, M.: Suspect psychology in science education. Times Educational Supplement, Apr. 3rd, 1987
g1

Smith, E.L.: What besides conceptions needs to change in conceptual change learning?. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 424-433
g1

Solomon, J.: Social influences on the construction of pupils' understanding of science. Studies in Science Education 14, 1987, 63-82
g1,g4

Solomon, J.: Social effects and personal cognitive style. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 448-466
g1

Strike, K.A.: Toward a coherent constructivism. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 481-489
g1

Tasker, R.: Children's views and classroom experiences. The Australian Science Tachers Journal 27, 3, 1981, 33-37
g1,g6,CTL

Tiberghien, A., Weil-Barais, A.: Les modeles spontanes dans la pensee commune et enfantine. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. Journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 47-56
g1

Varela, M., Wollman, W.: Improving problem solving in a statewide physics program. Paper presented at the annual meeting of the NARST, 1987
g1

g2 ALLTAGSVORSTELLUNGEN UND WISSENSCHAFTLICHE VORSTELLUNGEN

EVERYDAY NOTIONS AND SCIENTIFIC NOTIONS

Fedra, D.: Styropor ist warm und Eisen ist kalt - Sinnestäuschung oder physikalische Realität?. Polykop. Gesamthochschule Kassel, n.d.
g2,g6,P,T
Hills, G.L., McAndrews, B.: David Hawkins critical barriers and the education of elementary school science teachers. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 210-223
g1,g2,g9
Mayer, M.: Common sense knowledge versus scientific knowledge: the case of pressure, weight and gravity. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 299-310
g2,g6,P,AS,M,GEN
Schön, L.: Beschreibt Physik eigentlich das, was wir wahrnehmen?. Polykop. Gesamthochschule Kassel, n.d.
g2,g3

g3 GESCHICHTLICHE UND INDIVIDUELLE ENTWICKLUNG VON VORSTELLUNGEN

DEVELOPMENT OF NOTIONS IN THE HISTORY OF SCIENCE AS COMPARED TO DEVELOPMENT OF NOTIONS IN INDIVIDUALS

Carr, M., Oxenham, J.: Model confusion in science. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 1984, 61-69
g3,g6,C

Duit, R.: Zur Parallelität von Alltagsvorstellungen und Vorstellungen in der Geschichte der Wissenschaften. Vortrag auf der GDCP-Tagung, September 1987, Nürnberg, 1987, 1-8
g3

Fischbein, E., Stavy, R., Ma-Naim, H.: The psycological structure of naive impetus conceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 143-161
g3,g6,P,M

Gauld, C.: Empirical evidence and conceptual change. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 1984, 66-80
g3

Gil, P.D., Carracosa, A.J.: What to do for science misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 149-157
g1,g3

Giordan, A.: Premodeles et modeles (personells et historiques) a propos du champ conceptuel de respiration. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 143-149
g1,g3,g6,B

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle, 1987
g1,g3,g5,g6,g7,P,C,B

Matthews, M.R.: Experiment as the objectification of theory: Galileo's revolution. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 289-298
g3

Schön, L.: Beschreibt Physik eigentlich das, was wir wahrnehmen?. Polykop. Gesamthochschule Kassel, n.d.
g2,g3

Stork, H.: Zur Rolle der Naturwissenschaftsgeschichte im naturwissenschaftlichen Unterricht, vor allem im Chemieunterricht. Chemiker Zeitschrift 109, 9, 1985, 293-301
g3

g4 SPRACHE UND VORSTELLUNGEN

LANGUAGE AND NOTIONS

Kenealy, P.: A syntactic source of a common "misconception" about acceleration. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 276-292
g4,g0,P,M
McNaught, C.: Science concept development in a developing country context. Paper presented at the Ass. of Sc. Ed. Annual Meeting, Cardiff, 1987
g1,g4
Solomon, J.: Social influences on the construction of pupils' understanding of science. Studies in Science Education 14, 1987, 63-82
g1,g4

g5 METHODEN ZUR ERFASSUNG VON VORSTELLUNGEN

METHODS TO INVESTIGATE NOTIONS

Alvarez, M.C., Risko, V.J.: Using vee diagrams to clarify third-grade students' misconceptions during a science experiment. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 1987, 6-14
g5,g7

Amir, R., Frankl, D.R., Tamir, P.: Justification of answers to multiple choice items as a means for identifying misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 1987, 15-25
g5,g6,B

Anderson, C.W., Belt, B.L., Gamalski, J.M., Greminger, J.E.: A social constructivist analysis of classroom science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 11-24
g1,g5,g9

Ault, C.R.: Structured interviews and children's science conceptions. Polycop., Indiana University, Bloomington, n.d.
g5

Bar, V.: The effect of the testing format on the distribution of the results. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 1987, 26-31
g5,g6,P,T

Bell, B., Osborne, R.: Interviewing children - a checklist for the I.A.I. interviewer. Working Paper No.45, University of Waikato, Learning in Science Project, 1981, 1-18
g5

Cachapuz, A.F., Maskill, R.: Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. Intern.Journal of Science Education 9, 4, 1987, 491-504
g5,g6,g7,C,P,T

Calderhead, J.: Developing a framework for the elicitation and analysis of teachers' verbal reports. Paper presented at the Annual Meeting of AERA, San Francisco, 1986, 1-16
g5

Caravita, S., Tonucci, F.: Problemes methodologiques dans la recherche sur les representations mentales des enfants de l'ecole primaire sur les themes biologico-naturalistes. Paper presented at the "Le Fonctionnement de l'enfant a l'ecole" Congres International, Universite de Poitiers, 1987
g5

Ellerton, N.F., Ellerton, N.D.: Mathematics and chemical problems created by students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 131-136
g5,g6,C,CSC

Eylon, B.-S., Ben-Zwi, R., Silberstein, J.: Hierarchical task analysis - an approach for diagnosing students' conceptual difficulties. International Journal of Science Education 9, 2, 1987, 187-196
g5

Fraser, K., Edwards, J.: Concept maps as reflectors of conceptual understanding. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 187-192
g5,g7

Gilbert, J., Pope, M.: Small group discussions about conceptions in science: a case study. Research in Science & Technological Education 4, 1, 1986, 61-76
g5

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle, 1987
g1,g3,g5,g6,g7,P,C,B

Haney, R.E: The development of a non-verbal test of children's concepts of animals. Journal of Research in Science Teaching 3, 3, 1965, 198-203
g5,g6,B

Hoz, R., Tomer, Y., Bowman, D., Chayoth, R.: The use of concept mapping to diagnose misconceptions in biology and earth sciences. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 246-256
g5,g6,B

Jung, W.: Understanding students' understanding: the case of elementary optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 268-277
g5,g6,P,O

Kuhn, C., Aguirre, J.: A case study on the "journal method", a method designed to enable the implementation of constructivist teaching in the classroom. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 262-274
g1,g5,g7

MacGuire, P.R., Johnstone, A.H.: Techniques for investigating the understanding of concepts in science. Intern.Journal of Science Education 9, 5, 1987, 565-577
g5

Megarity, M.T.: What does the student know? Investigating a commonsense theory of motion. In: Lewis, R., Tagg, E.D.: Trends in computer assisted education. Oxford: Blackwell Scientific Publications, 1986, 232-234
g5,g6,P,M

Moreira, M.A.: Concept mapping as a possible strategy to detect and to deal with misconceptions in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 352-360
g5,g6,P,E

Pope, M., Denicolo, P.: Intuitive theories - a researcher's dilemma: some practical methodological implications. British Educational Research Journal 12, 2, 1986, 153-166
g5

Pope, M., Gilbert, J.: Students' conceptions: themes and variations. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 1988, 86-120
g1,g5

Pope, M., Watts, M., Gilbert, J.: Constructive educational research. Paper presented at the 9th annual conference of the BERA, London, 1983
g1,g5

Renström, L.: Pupils conceptions of matter. A phenomenographic approach. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 400-414
g5,g6,P,C,AT

Snively, G.: The metaphor interview and the analyses of conceptual change. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 434-447
g5,g6

Sumfleth, E.: Verfahren zur Untersuchung kognitiver Strukturen. chimica didactica 13, 1987, 161-193
g5

Tobias, S.D.: In class methods for getting at student misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 514-516
g5

Treagust, D.F.: An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 512-522
g5,g6,g7,P,C,B,AS

Wandersee, J.H.: Drawing concept circles: a way of revealing what the learner knows. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 506-520
g5

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

P,E: Bereich der Physik / Elektrizität
area of physics / electricity

Ameh, C.O.: Misconceptions in science amongst nigerian science teachers and students. In: Riquarts, K.: Science and technology education and the quaility of life. Kiel: IPN-Materialien, 1987, 321-330
g6,g8,P,E,M

Black, D., Solomon, J.: Can pupils use taught analogies for electric current?. School Science Review, Dec., 1987, 249-254
g6,P,E

Buchweitz, B., Moreira, M.A.: Misconceptions in physics: research findings among Brazilian students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 64-68
g6,P,E

Danusso, L., Dupre, F.: Student representations of simple electric circuits. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 111-118
g6,P,E

Ganiel, U., Eylon, B.S.: Electrostatics and electrodynamics - the missing link in students' conceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 166-179
g6,P,E

Heller, P.: Use of core propositions in solving current electricity problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 226-236
g6,g8,P,E

Kärrquist, C.: Pupils are able. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 293-298
g6,P,E

Moreira, M.A.: Concept mapping as a possible strategy to detect and to deal with misconceptions in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 352-360
g5,g6,P,E

Rhöneck, Ch.von, Grob, K.: Representation and problem-solving in basic electricity-predictors for successful learning. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 564-577
g6,P,E

Thorley, N.R., Treagust, D.F.: Conflict within dyadic interactions as a stimulant for conceptual change in physics. Intern.Journal of Science Education 9, 2, 1987, 203-216
g6,g7,P,M,E

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

P,T: Bereich der Physik / Wärme
area of physics / heat

Bar, V.: The effect of the testing format on the distribution of the results. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 1987, 26-31
g5,g6,P,T

Cachapuz, A.F., Maskill, R.: Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. Intern.Journal of Science Education 9, 4, 1987, 491-504
g5,g6,g7,C,P,T

Engel Clough, E., Driver, R.: How do children's scientific ideas change over time?. School Science Review, Dec., 1987, 255-267
g6,P,B,T,M

Erätuuli, M.: Welche Vorstellungen haben finnische Schüler von den alltäglichen Phänomenen der Wärmelehre. Helsinki: University of Helsinki/Department of Teacher Education, 1987
g6,P,T

Pedra, D.: Styropor ist warm und Eisen ist kalt - Sinnestäuschung oder physikalische Realität?. Polykop. Gesamthochschule Kassel, n.d.
g2,g6,P,T

Grimellini Tomasini, N., Pecori Balanda, B.: Teaching strategies and children's science: an experiment on teaching about hot and cold. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 158-171
g6,g7,P,T

Vuilleumier, B.: "L'homme est la mesure de toutes choses" ou Les biais de la pensee commune. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 269-274
g6,P,M,T

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

P,M: Bereich der Physik / Mechanik
area of physics / mechanics

Ameh, C.O.: Misconceptions in science amongst nigerian science teachers and students. In: Riquarts, K.: Science and technology education and the quallity of life. Kiel: IPN-Materialien, 1987, 321-330
g6,g8,P,E,M

Boeha, B.B.: Students' beliefs in science - a third world perspective. In: Riquarts, K.: Science and technology education and the quallity of life. Kiel: IPN-Materialien, 1987, 342-348
g6,P,M

Brown, D.E., Clement, J.: Misconceptions concerning Newton's law of action and reaction: the underestimated importance of the third law. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 39-53
g6,P,M

Engel Clough, E., Driver, R.: How do children's scientific ideas change over time?. School Science Review, Dec., 1987, 255-267
g6,P,B,T,M

Feldsine, J.E.: Distinguishing student misconceptions from alternative frameworks trough the construction of concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 177-181
g6,g7,P,C,M

Fischbein, E., Stavy, R., Ma-Naim, H.: The psycological structure of naive impetus conceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 143-151
g3,g6,P,M

Friedler, Y., Amir, R., Tamir, P.: High school students' difficulties in understanding osmosis. Intern.Journal of Science Education 9, 5, 1987, 541-551
g6,P,M

Giese, P.A.: Misconceptions about water pressure. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 143-148
g6,P,M

Harel, G., Hoz, R.: Declarative and procedural knowledge and isomorphisms of speed problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 203-210
g6,P,M

Ivowi, U.M., Oludotun, J.S.: An investigation of sources of misconceptions in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 252-257
g6,P,M,EN

Jones, B.: How solid is a solid: does it matter?. Research in Science Education 14, 1984
g6,P,M

Kenealy, P.: A syntactic source of a common "misconception" about acceleration. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 278-292
g4,g6,P,M

Lawson, R.A., Mc.Dermott, L.C.: Student understanding of the work-energy and impulse-momentum theorem. Paper accepted by American Journal of Physics, n.d.
g6,P,M,EN

Levin, I., Gardosh, R., V.N.: The development of the concept of speed. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 297-301
g6,P,M

Maurines, L.: Premieres notions sur la propagation des signaux mecaniques: analyse des difficultes des etudiants. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 57-62
g6,P,M

Mayer, M.: Common sense knowledge versus scientific knowledge: the case of pressure, weight and gravity. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 299-310
g2,g6,P,AS,M,GEN

McDermott, L.C., Rosenquist, M.L., Zee, E.H.van: Student difficulties in connecting graphs and physics: examples from kinetics. American Journal of Physics 55, 6, 1987, 503-513
g6,P,M

Megarity, M.T.: What does the student know? Investigating a commonsense theory of motion. In: Lewis, R., Tagg, E.D.: Trends in computer assisted education. Oxford: Blackwell Scientific Publications, 1986, 232-234
g5,g6,P,M

Niedderer, H.: Alternative frameworks of students in mechanics and atomic physics.Methods of research and results. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 335-348
g6,g7,P,M,Q,CSC

Placek, W.A.: Preconceived knowledge of certain Newtonian concepts among gifted and non-gifted eleventh grade physics students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 386-391
g6,P,M

Rafel, J., Mans, C.: Alternative frameworks about the learning of changes of state of aggregation of matter: sorting of answers into models. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 392-399
g6,P,M

Shanon, B.: Aristotelianism, newtonianism and the physics of the layman. Perception 5, 1976, 241-243
g6,P,M

Simpson, M., Arnold, B.: Availability of prerequisite concepts for learning biology at certificate level. Journal of Biological Education 16, 1, 1982, 65-72
g6,P,EN,M,B

Stepans, J., Dyche, S.: Using the personal interview to determine student misunderstandings in science and some suggestions for alleviating those misunderstandings. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 466-480
g6,g7,P,M,B

Thiaje, G.D.: Conceptions of force and movement, intuitive ideas of pupils in Zimbabwe in comparison with findings from other countries. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 501-513
g6,P,M

Thorley, N.R., Treagust, D.F.: Conflict within dyadic interactions as a stimulant for conceptual change in physics. Intern.Journal of Science Education 9, 2, 1987, 203-216
g6,g7,P,M,E

Touger, J.S., Dufresne, R., Gerace, W., Mestre, J.: Hierarchial organization of knowledge and coherent explanation in the domain of elementary mechanics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 517-530
g6,P,M

Vuilleumier, B.: "L'homme est la mesure de toutes choses" ou Les biais de la pensee commune. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 269-274
g6,P,M,T

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

P,O: Bereich der Physik / Optik
area of physics / optics

Ault, C.: Interview studies in teacher education: examples from extraordinary contexts. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 25-29
g1,g6,P,O,S

Bouwens, R.E.: Misconceptions among pupils regarding geometrical optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 23-38
g6,P,O,GEN

Zagalhade, A., Baberdas, J.: A propos de modeles "spontanes" de phenomenes lies a la lumiere. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. Journees Int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 304-308
g6,P,O

Feher, E., Rice, K.: A comparison of teacher student conceptions in optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 108-117
g6,g8,P,O

Jung, W.: Understanding students' understanding: the case of elementary optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 268-277
g5,g6,P,O

Lefevre, R.: Modeles de la lumiere: les conceptions des etudiants de 1ere annee universitaire. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. Journees Int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 297-302
g6,P,O

Rice, K., Feher, E.: Pinholes and images: children's conceptions of light and vision I. Science Education 71, 4, 1987, 629-639
g6,P,O

Stead, B., Osborne, R.: Light. Working Paper No. 23, University of Waikato, Learning in Science Project, 1980, 1-24
g6,P,O

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

P,AT: Bereich der Physik / Atome, Teilchen
area of physics / atoms, particles

Furio-Mas, C., Hernandez-Perez, J.: Instabilite des conceptions alternatives des eleves du primaire et du secondaire sur les gaz. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 345-350
g6,P,AT

Renström, L.: Pupils conceptions of matter. A phenomenographic approach. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 400-414
g5,g6,P,C,AT

Scott, P.: The process of conceptual change in science: a case study of the development of a secondary pupil's ideas relating to matter. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 404-419
g6,g7,P,AT

Simpson, M., Arnolds, B.: Diagnosis in action. Aberdeen: Aberdeen College of Education, 1984
g6,g7,P,EN,AT,B

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

P.AS: Bereich der Physik / Astronomie
area of physics / astronomy

Jones, B., Lynch, P.P., Reesink, C.: Children's conceptions of the earth, sun and moon. International Journal of Science Education 9, 1, 1987, 43-53
g6.P.AS.GEN

Lightman, A.P., Miller, J.D., Leadbeater, B.J.: Contemporary cosmological beliefs. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 309-321
g6.P.AS.GEN

Mayer, M.: Common sense knowledge versus scientific knowledge: the case of pressure, weight and gravity. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 299-310
g2.g6.P.AS.M.GEN

Ogunniyi, M.B.: Conceptions of traditional cosmological ideas among literate and nonliterate Nigerians. Journal of Research in Science Teaching 24, 2, 1987, 107-117
g6.P.AS

Sadler, P.M.: Misconceptions in astronomy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 422-425
g6.P.AS

Targan, D.S.: A study of conceptual change in the content domain of the lunary phase . In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 499-511
g6.g7.P.AS

Treagust, D.F.: An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 512-522
g5.g6.g7.P.C.B.AS

Vosniadou, S.: Children's acquisition and restructuring of science knowledge. Paper presented at the symposium "Children's procedural knowledge in science", AERA Annual Meeting, Washington D.C.., 1987
g6.P.AS

Vosniadou, S., Brewer, W.F.: Theories of knowledge restructuring in development. Review of Educational Research 57, 1, 1987, 51-67
g6.P.AS

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

P,EN: Bereich der Physik / Energie
area of physics / energy

Gilbert, J., Pope, M.: Schoolchildren discussing energy. Surrey: Institute of Educational Development/University of Surrey, 1982
g6,P,EN

Ivowi, U.M., Oludotun, J.S.: An investigation of sources of misconceptions in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 252-257
g6,P,M,EN

Lawson, R.A., Mc.Dermott, L.C.: Student understanding of the work-energy and impulse-momentum theorem. Paper accepted by American Journal of Physics, n.d.
g6,P,M,EN

Simpson, M., Arnold, B.: Availability of prerequisite concepts for learning biology at certificate level. Journal of Biological Education 16, 1, 1982, 65-72
g6,P,EN,M,B

Simpson, M., Arnolds, B.: Diagnosis in action. Aberdeen: Aberdeen College of Education, 1984
g6,g7,P,EN,AT,B

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

P/ ENT,FLD,INF,IRR,MAG,Q,R,S,STAT / CTL,CBC,STB:
Bereich der Physik / Sonstige
area of physics / others

Ault, C.: Interview studies in teacher education: examples from extraordinary contexts. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 25-29
g1,g6,P,O,S

Barrow, L.H.: Magnet concepts and elementary students' misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 17-22
g6,P,MAG

Eijkelhof, H.C., Klaassen, R., Lijnse, P.: Public and pupil's ideas about radiation: some lessons from Chernobyl to science educators. In: Riquarts, K.: Science and technology education and the quality of life. Kiel: IPN-Materialien, 1987, 686-693
g6,P

Genin, C., Pellet, A., Michaud-Bonnet, J.: Structuration mathematique des representations des eleves scientifiques a propos des grandeurs physiques vectorielles. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. Journees Int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 112-116
g6,g7,P

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle, 1987
g1,g3,g5,g6,g7,P,C,B

Linder, C.J.: Tertiary physics : a case study in students' conceptions of sound. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 322-334
g6,P,S

Niedderer, H.: Alternative frameworks of students in mechanics and atomic physics.Methods of research and results. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 335-348
g6,g7,P,M,Q,CBC

Villani, A., Pacca, J.L.A.: Students' spontaneous ideas about the speed of light. International Journal of Science Education 9, 1, 1987, 55-66
g6,P,R

Zee, E.van, McDermott, L.: Investigation of student difficulties with graphical representations in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 531-539
g6,P

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

C: Bereich der Chemie
area of chemistry

Barke, H.D.: Die neue Konstante k(TAP)- die Arbeit eines Schülers. Praxis-Chemie 31, 1982, 306-308
g6,C

Barke, H.D.: Schülerversuche mit Strukturmodellen. Empirische Untersuchungen zum praktischen Einsatz von Modellen bei der Einführung von chemischen Symbolen. Der Chemieunterricht 13, 4, 1982, 4-21
g6,C

Cachapuz, A.F., Martins, I.P.: High school students' ideas about energy of chemical reactions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 60-68
g6,C,EN

Cachapuz, A.F., Maskill, R.: Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. Intern.Journal of Science Education 9, 4, 1987, 491-504
g5,g6,g7,C,P,T

Carr, M., Oxenham, J.: Model confusion in science. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 1984, 81-88
g3,g6,C

Ellerton, N.F., Ellerton, H.D.: Mathematics and chemical problems created by students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 131-136
g5,g6,C,CSC

Eylon, B., Ben-Zwi, R., Silberstein, J.: Student conception of structure and process in chemistry, part I and II. In: White, A., Blosser, P.,: NARST annual meeting, abstracts of papers. Columbus: ERIC/CLNGHE SCI., MATH.,& ENVIRON.,ED., 1982
g6,C

Feldsine, J.E.: Distinguishing student misconceptions from alternative frameworks trough the construction of concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 177-181
g6,g7,P,C,M

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle, 1987
g1,g3,g5,g6,g7,P,C,B

Gorodetzky, M., Gussarsky, E.: The role of students and teachers in misconceptualisation of aspects in chemical equilibrium. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 187-193
g6,g8,C

Rennström, L.: Pupils conceptions of matter. A phenomenographic approach. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 400-414
g5,g6,P,C,AT

Ringnes, V.: Misconceptions in environmental chemistry among Norwegian students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 415-421
g8,C,STS

Schmidt, H.J.: Secondary school students' learning difficulties in stoichiometry. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 396-404
g8,C

Sequeira, M., Freitas, M.: Children's alternative conceptions about "mold" and "copper oxide". In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 413-423
g6,C,B

Treagust, D.F.: An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 512-522
g5,g6,g7,P,C,B,AS

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

B: Bereich der Biologie
area of biology

Adeniyi, E.O.: Misconceptions of selected ecological concepts held by some Nigerian students. Journal of Biological Education 19, 4, 1985, 311-316
g6,B

Amir, R., Frankl, D.R., Tamir, P.: Justification of answers to multiple choice items as a means for identifying misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 1987, 15-25
g5,g6,B

Askham, L.R.: The effects of plants on classification behavior in an outdoor environment. Journal of Research in Science Teaching 13, 1, 1976, 49-54
g6,B

Bell, B.: When an animal is not an animal. Journal of Biological Education 15, 3, 1981, 213-218
g6,B

Bernstein, A.C., Cowan, P.A.: Children's concepts of how people get babies. Child Development 46, 1975, 77-91
g6,B

Berzonsky, M.D., Ondrako, M.A., Williams, G.T.: Modifications of the life concept in reflective and impulsive children. Journal of Genetic Psychology 130, 1977, 11-17
g6,B

Billeh, V.Y., Pella, M.O.: Cultural bias in the attainment of concepts of the biological cell by elementary school children. Journal of Research in Science Teaching 7, 2, 1972, 73-83
g6,B

Billeh, V.Y., Pella, M.O.: Relationships between mental maturity, ability level and level of understanding of three categories of science concepts. Science Education 56, 1, 1972, 5-16
g6,B

Blum, L.H.: Health information via mass media: study of the individual's concepts of the body and its parts. Psych. Reports 40, 3, 1977, 991-999
g6,B

Bowd, A.D.: Children's fears of animals. Journal of Genetic Psychology 142, 1983, 313-314
g6,B

Bowd, A.D.: Fears and understanding of animals in middle childhood. Journal of Genetic Psychology 145, 1984, 143-144
g6,B

Caravita, S., Tonucci, F.: How children know biological structure-function-relationships. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 65-73
g6,B

Caravita, S., Tonucci, F., Consoli, V., Rusca, G.: Investigating pupils' conceptualization in the biological domain: structure-function relationships. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 1988, 1-19
g6,B

Clemens, T.R., Janke, D.L.: Mastery levels of three important biology concepts by junior high school students. Paper presented at the Annual Meeting of the AERA, San Francisco, 1976
g6,B

Collins, A.: A description of the strategic knowledge of experts solving transmission genetics problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 78-90
g6,B

Conn, J.H.: Children's awareness of the origins of babies. Journal of Child Psychiatry, 1, 1947, 140-176
g6,B

Conn, J.H., Kanner, L.: Children's awareness of sex differences. Journal of Child Psychiatry, 1, 1947, 3-57
g6,B

Davidson, D.: Children's concepts of the human body: a study of cognitive development. Unpublished doctoral thesis, United States International University, 1981
g6,B

Deneby, J.A.: A study of school-aged children's knowledge of five body organs. Unpublished doctoral thesis, University of Iowa, 1978
g6,B

Dreyfus, A., Jungwirth, E.: The pupil and the living cell: a taxonomy of dysfunctional ideas about an abstract idea. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 91-96
g6,B

Engel Clough, E., Driver, R.: How do children's scientific ideas change over time?. School Science Review, Dec., 1987, 255-267
g6,P,B,T,E

Engström, Y.: The laws of nature and the origin of life in pupil's conciousness: a study of contradictory modes of thought. Scandinavian Journal of Educational Research 25, 2, 1981, 39-61
g6,B

Evans, J.D.: Putting names to concepts in biology. Journal of Biological Education 12, 4, 1978, 261-266
g6,B

Fallon, A.E., Rozin, P., Pliner, P.: The child's conception of food: the development of food rejections with special reference to disgust and contamination sensitivity. Child Development 55, 1984, 566-575
g6,B

Gartley, W., Bernasconi, M.: The concept of death in children. Journal of Genetic Psychology 110, 1967, 71-85
g6,B

Gellert, E.: Children's conceptions of the content and functions of the human body. Genetic Psych. Monographs 65, 1962, 293-405
g6,B

Gillespie, J.P.: A study of concept development and communication abilities in young children using variations in leaf morphology. Journal of Research in Science Teaching 9, 1, 1972, 57-64
g6,B

Giordan, A.: Les representations des eleves: outils pour la pedagogie. Cahiers Pedagogiques 214, 1983, 26-28
g1,g6,B

Giordan, A.: Des representations des eleves a l'appropriation de quelques concepts scientifiques. In: Giordan, A.: Reconstruire son savoir. Paris: Messidor, 1986, 113-127
g1,g6,B

Giordan, A.: Premodeles et modeles (personnels et historiques) a propos du champ conceptuel de respiration. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 143-149
g1,g3,g6,B

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle, 1987
g1,g3,g5,g6,g7,P,C,B

Graham, I.: Difficulties encountered by biology students in understanding and applying the mole concept. Journal of Biological Education 17, 4, 1983, 339-342
g6,B

Griffiths, A.K., Grant, B.A.: High school student's understanding of food webs: identification of a learning hierarchy and related misconceptions. Journal of Research in Science Teaching 22, 5, 1985, 421-436
g6,B

Hackling, M.: An examination of secondary student's understanding of inheritance concepts. Australian Science Teachers Journal 28, 1, 1982, 13-20
g6,B

Hallden, O.: The evolution of the species - pupil perspectives and school perspectives. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN, 1988, 21-66
g6,B

Haney, R.E: The development of a non-verbal test of children's concepts of animals. Journal of Research in Science Teaching 3, 3, 1965, 199-203
g5,g6,B

Happs, J.C., Scharpenzeel, L.: Achieving long term conceptual change using the learners prior knowledge and a novel teaching setting. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 172-181
g6,g7,B

Hickman, F.M., Kennedy, M.H., McInerny, J.D.: Human genetics education: results of BSCS needs assessment surveys. American Biology Teacher 40, 5, 1978, 285-303
g6,B

Hildebrand, A.C.: Conceptual difficulties associated with understanding genetics: a review of the literature on genetics learning. Unpublished Manuscript, 1988, 1-21
g6,B

Hoz, R., Tomer, Y., Bowman, D., Chayoth, R.: The use of concept mapping to diagnose misconceptions in biology and earth sciences. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 245-256
g5,g6,B

Jahoda, G.: Child animism I: a critical survey of cross cultural research. Journal of Social Psych. 47, 1958, 197-212
g6,B

Jimenez Aleixandre, M.P., Fernandez Perez, J.: Selection or adjustment? Explanations of university biology students for natural selection problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 224-238
g6,B,GEN

Johnson, C.N., Hendrick, K.: Body partonomy: how children partition the human body. Developmental Psychology 20, 5, 1984, 967-974
g6,B

Jungwirth, E.: A comparison of the acquisition of taxonomic concepts by BSCS and BSCS pupils. Australian Science Teachers Journal 17, 4, 1971, 80-82
g6,B

Jungwirth, E.: Preconceived adaption and inverted evolution. Australian Science Teachers Journal 21, 2, 1975, 95-100
g6,B

Kane, B.: Children's concepts of death. Journal of Genetic Psychology 134, 1979, 141-153
g6,B

Kinnear, J.F., Martin, M.D.: Symbol use and concept development in genetic engeneering. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 246-259
g6,B

Kreitler, H., Kreitler, S.: Children's concepts of sexuality and birth. Child Development 37, 1966, 363-378
g6,B

Lazarowitz, R.: Correlations of junior high school students' age, gender and intelligence with ability to construct classification in biology. Journal of Research in Science Teaching 18, 1, 1981, 15-22
g6,B,GEN

Looft, W.R., Charles, D.C.: Modification of the life concept in children. Develomental Psychology 1, 4, 1964, 445
g6,B

Looft, W.R.: Animistic thought in children: effect of two response modes. Perceptual and Motor Skills 36, 1973, 59-62
g6,B

Looft, W.R.: Animistic thought in children: understanding living across its associated attributes. Journal of Genetic Psychology 124, 1974, 235-240
g6,B

Marek, E.: Understandings and misunderstandings of biology concepts. American Biology Teacher 48, 1, 1986, 37-40
g6,B

Marek, E.A.: They misunderstand, but they'll pass. The Science Teacher, Dec., 1986, 32-35
g6,B

Martin, F.L.: The development of an instrument for determining botanically related misconceptins of beginning college botany students. Unpublished doctoral thesis, University of Southern Mississippi, 1979
g6,B

Maurer, A.: Maturation of concepts of live. Journal of Genetic Psychology 116, 1970, 101-111
g6,B

Merkle, D.G., Treagust, D.F.: Secondary school students' locus of control and conceptual knowledge related to health and fitness. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 325-337
g6,B

Mintzes, J.J., Trowbridge, J.E.: Alternative frameworks in animal classification. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 338-347
g6,B

Moore, J.E., Kendall, D.C.: Children's concepts of reproduction. Journal of Sex Research 7, 1971, 42-61

g6,B

Murray, D., Bowbal, D.: Constructing a conceptual framework for solving a problem. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 348-359

g6,B

Nagy, M.H.: The child's theories concerning death. Journal of Genetic Psychology 73, 1948, 3-27

g6,B

Nagy, M.H.: Children's birth theories. Journal of Genetic Psychology 83, 1953, 217-226

g6,B

Nagy, M.H.: Children's conceptions of some bodily functions. Journal of Genetic Psychology 83, 1953, 199-216

g6,B

Nagy, M.H.: The representation of "germs" by children. Journal of Genetic Psychology 83, 1953, 227-240

g6,B

Porter, C.S.: Grade school children's perceptions of their internal body parts. Nursing Research 23, 5, 1974, 384-381

g6,B

Quiggin, V.: Children's knowledge of their internal body parts. Nursing Times 73, 30, 1977, 1146-1151

g6,B

Riechard, D.E.: Life-science concept development among beginning kindergarten children from three different communities. Journal of Research in Science Teaching 10, 1, 1973, 39-50

g6,B

Rozin, P., Fallon, A., Augustoni, M.: The child's conception of food: the development of contamination sensitivity to "disgusting" substances. Developmental Psychology 21, 6, 1985, 1075-1079

g6,B

Russel-Gebett, J.: Pupil's preconceptions of three dimensional structures in biology lessons. Journal of Biological Education 18, 3, 1984, 220-225

g6,B

Russel-Gebett, J.: Skills and strategies: pupil's approaches to three dimonsional problems in biology. Journal of Biological Education 19, 4, 1985, 293-298

g6,B

Russell, R.W., Dennis, W.: Note concerning the procedure employed in investigating child aniamism. Journal of Genetic Psychology 58, 1941, 423-424

g6,B

Ryman, D.: Childrens' understanding of the classification of living organisms. Journal of Biological Education 8, 3, 1974, 140-144

g6,B

Safier, G.: A study in relationship between life and death concepts in children. Journal of Genetic psychology 105, 1964, 283-294

g6,B

Schall, V.T., Jurberg, P., Boruchovitch, E., Felix-Sousa, I.C., Rozemberg, B., Vasconcellos, M.C.: Health education for children, developing a new strategy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 390-403

g6,g7,g8,B

Schilder, P., Wechsler, D.: What do children know about the interior parts of the body?. International Journal of psychoanalysis 16, 1935, 355-360
g6,B

Sequeira, M., Freitas, M.: Children's alternative conceptions about "mold" and "copper oxide". In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 413-423
g6,C,B

Simpson, M., Arnold , B.: Educational psychology and the teaching of specialist subjects. Scottish Educational Review 14, 2, 1982, 109-117
g6,g7,B

Simpson, M., Arnold, B.: Availability of prerequisite concepts for learning biology at certificate level. Journal of Biological Education 16, 1, 1982, 65-72
g6,P,EN,M,B

Simpson, M., Arnold , B.: Diagnostic tests and criterion-referenced assessment: their contribution to the resolution of pupil learning difficulties. Programmed Learning and Educational Technology 20, 1, 1983, 36-42
g1,g6,g7,B

Simpson, M., Arnold , B.: Diagnosis in action. Aberdeen: Aberdeen College of Education, 1984
g6,g7,P,EN,AT,B

Simpson, M., Arnold, B.: Readings on learning difficulties in secondary school science - reprints from ACE biology newsletter. Aberdeen: Aberdeen College of Education, 1986
g6,g7,B

Slack, S.J., Streibel, M., Collins, A.: A description of student problem solving performance on realistic genetics problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 452-460
g6,B

Smeets, P.M.: The influence of MA and CA on the attribution of life and life traits to animate and inanimate objects. Journal of Genetic Psychology 124, 1974, 17-27
g6,B

Stavy, R.: How students aged 13-15 understand photosynthesis. International Journal of Science Education 9, 1, 1987, 105-115
g6,B

Stead, B.: Plants. Working Paper No.24, University of Waikato, Learning in Science Project, 1980, 1-19
g6,B

Stead, B.: Animal. Working Paper No.22, University of Waikato, Learning in Science Project, 1980, 1-24
g6,B

Stead, B.: Living. Working Paper No.15, University of Waikato, Learning in Science Project, 1980, 1-22
g6,B

Stepans, J., Dyche, S.: Using the personal interview to determine student misunderstandings in science and some suggestions for alleviating those misunderstandings. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 466-480
g6,g7,P,M,B

Stilwell, S., Brody, M.: Cross cultural analysis of student understanding of marine science and natural resource concepts related to the gulf of Maine. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 490-498
g6,B,STS

Tait, C.D., Asher, R.C.: Inside-of-the-body test: a preliminary report. Psychosomatic Medicine 17, 2, 1955, 139-148
g6,B

Tamir, P., Gal-Choppin, R., Nussionovitz, R.: Plant identification: a worthwhile aspect of achievment in biology. Australian Science Teachers Journal 18, 4, 1974, 52-66
g6,B

Treagust, D.F.: An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 512-522
g5,g6,g7,P,C,B,AS

Wandersee, J.H.: Plants or animals: which do junior high school students prefer to study?. Journal of Research in Science Teaching 23, 5, 1986, 415-426
g6,B

Wandersee, J.H., Mintzes, J.J.: Children's biology: a content analysis of conceptual development in the life sciences. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 523-534
g6,B

White, E., Elsom, B., Prawat, R.: Children's conceptions of death. Child Development 49, 1978, 307-310
g6,B

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON SCHÜLERN/STUDENTEN

INVESTIGATIONS OF STUDENTS' NOTIONS

Sonstige
others

Abdullah, K.B., Lowell, W.E.: The ability of children to generalize selected science concepts. Journal of Research in Science Teaching 18, 6, 1981, 547-555
g6

Baird, J., Mitchell, I.: Improving the quality of teaching and learning - an Australian case study. Melbourne: The Monash University Printery, 1986
g1,g6,g8,g9,CTL

Benson, G.D.: Open-endness in the empirical analytic mode: one conception of scientific progress. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 59-66
g1,g6,g8,CSC

Brody, M.J.: A programmatic approach to teaching and learning about students understanding of science and natural resource concepts related to environmental issues. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 67-80
g6,g7,STS

Carter, C., Bodner, G.: How students' conceptions of the nature of chemistry and mathematics influence problem solving. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 69-83
g6,CTL,CSC

Finley, F.N.: Changes in students' knowledge during a simulated search for oil. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 118-132
g6

George, J., Glasgow, J.: Conventional science and street science in the West Indies. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 220-232
g6

Jungwirth, E.: Improper attribution of causality - a potential stumbling block for STS education. In: Riquarts, K.: Science and technology education and the quality of life. Kiel: IPN-Materialien, 1987, 694-699
g6

King, W.H.: Symposium: studies of children's scientific concepts and interests: I The development of scientific concepts in children. British Journal of Educational Psychology 31, 1961, 1-20
g6

Maloney, D.P.: Rule usage on related tasks: patterns of consistency. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 335-349
g6

Neuberger, H.T.: Conceptualizations of change held by ten and eleven year old children. Journal of Research in Science Teaching 4, 3, 1966, 180-181
g6

Segre, G., Giani, U., Masillo, S.: Analogical reasoning and formalization in transport processes. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 420-423
g6
Snively, G.: The metaphor interview and the analyses of conceptual change. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 434-447
g5,g6
Solomon, J.: The pupils' view of electricity revisited: social development or cognitive growth?. International Journal of Science Education 9, 1, 1987, 13-22
g6,GEN
Stavy, R.: Acquisition of conservation of matter. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 456-466
g6
Tan, S.K.: A conceptualisation of students' meaning of understanding of physics in the high school classroom. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 491-500
g6,CTL
Tasker, R.: Children's views and classroom experiences. The Australian Science Tachers Journal 27, 3, 1981, 33-37
g1,g6,CTL
Voelker, A.M.: Elementary school children's level of attainment of selected classificatory science concepts. Paper presented at the Annual Meeting of NARST, Chicago, 1972
g6

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENTS' NOTIONS INTO ACCOUNT

P.E: Bereich der Physik / Elektrizität
area of physics / electricity

Arnold, M., Millar, R.: Teaching about electricity: a constructivist approach. Accepted for publication School Science Review, n.d.
g7.P.E

Arnold, M., Millar, R.: Being constructive: an alternative approach to the teaching of introductory ideas in electricity. Intern.Journal of Science Education 9, 5, 1987, 553-563
g7.P.E

Licht, P.: A strategy to deal with conceptual and reasoning problems in introductory electricity education. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 275-284
g7.P.E

Rhöneck, Ch.von, Grob, K.: Representation and problem solving in basic electricity - predictors for successful learning. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 1988, 57-83
g7.P.E

Thorley, N.R., Treagust, D.F.: Conflict within dyadic interactions as a stimulant for conceptual change in physics. Intern.Journal of Science Education 9, 2, 1987, 203-216
g6.g7.P.M.E

P.T: Bereich der Physik / Wärme
area of physics / heat

Cachapuz, A.F., Maskill, R.: Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. Intern.Journal of Science Education 9, 4, 1987, 491-504
g5.g6.g7.C.P.T

Grimellini Tomasini, N., Pecori Balandi, B.: Teaching strategies and children's science: an experiment on teaching about hot and cold. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 158-171
g6.g7.P.T

Linn, M.: Using the computer as a laboratory partner: cognitive consequences. Paper prepared for the symposium "Computers in school: cognitive and social processes", 2nd EARLI conference, Tübingen, 1987
g7.P.T

Rogan, J.M.: Development of a conceptual framework of heat. Science Education 72, 1, 1988, 103-113
g7.P.T

Stein,J.S.: Raising laboratory learning to a conceptual level: does MBL help?. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 471-479
g7.P.T

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENTS' NOTIONS INTO ACCOUNT

P,M: Bereich der Physik / Mechanik
area of physics / mechanics

Clement, J.: The use of analogies and anchoring intuitions to remediate misconceptions in mechanics. Paper presented at the annual meeting of AERA, Washington D.C., 1987
g7,P,M

Clement, J.: Overcoming students' misconceptions in physics: the role of anchoring intuitions and analogical validity. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 84-97
g7,P,M

Dufresne, R., Gerace, W., Hardiman, P.T., Mestre, J.: Hierarchially structured problem solving in elementary mechanics: guiding novices' problem analysis. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 1987, 116-130
g7,P,M

Feldsine, J.E.: Distinguishing student misconceptions from alternative frameworks trough the construction of concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 177-181
g6,g7,P,C,M

Predette, N.H.: Student use of computers to self-evaluate data from introductory physics laboratories. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 193-205
g7,P,M

Niedderer, H.: A teaching strategy based on students' alternative frameworks-theoretical concepts and examples. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 360-367
g1,g7,P,M

Niedderer, H.: Alternative frameworks of students in mechanics and atomic physics.Methods of research and results. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 335-348
g6,g7,P,M,Q,CSC

Ogborn, J.: Prolog and models of reasoning in science. Physics Education 22, 1987, 225-229
g7,P,M

Ranney, M.: Restructuring of motion in physics-naive students. Paper presented at the annual meeting of the AERA, Washington D.C., 1987, 1-8
g7,P,M

Rosenquist, M.L., McDermott, L.C.: A conceptual approach to teaching kinetics. American Journal of Physics 55, 5, 1987, 407-415
g7,P,M

Schultz, K., Murray, T., Clement, J., Brown, D.: Overcoming misconceptions with a computer based tutor. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 434-447
g7,P,M

Stepans, J., Dyche, S.: Using the personal interview to determine student misunderstandings in science and some suggestions for alleviating those misunderstandings. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 466-480
g6,g7,P,M,B

Thorley, N.R., Treagust, D.F.: Conflict within dyadic interactions as a stimulant for conceptual change in physics. Intern.Journal of Science Education 9, 2, 1987, 203-216
g6,g7,P,M,E

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENTS' NOTIONS INTO ACCOUNT

P,O: Bereich der Physik / Optik
area of physics / optics

Goldberg, F.: Using an interactive videodisc as a tool for investigating and facilitating student understanding in geometrical optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 180-186
g7,P,O

Reiner, M., Finegold, M.: Changing students' explanatory frameworks concerning the nature of light using real time computer analysis of laboratory experiments and computerized explanatory simulations of e.m. radiation. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 368-377
g7,P,O

P,AT: Bereich der Physik / Atome, Teilchen
area of physics / atoms, particles

Scott, P.: The process of conceptual change in science: a case study of the development of a secondary pupil's ideas relating to matter. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 404-419
g6,g7,P,AT

Simpson, M., Arnold , B.: Diagnosis in action. Aberdeen: Aberdeen College of Education, 1984
g6,g7,P,EN,AT,B

P,AS: Bereich der Physik / Astronomie
area of physics / astronomy

Targan, D.S.: A study of conceptual change in the content domain of the lunary phase . In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 499-511
g6,g7,P,AS

Treagust, D.F.: An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 512-522
g5,g6,g7,P,C,B,AS

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENTS' NOTIONS INTO ACCOUNT

P.EN: Bereich der Physik / Energie
area of physics / energy

Alanach, D., Anderson, M., Brook, A., Davidson, J., Dow, A., Driver, R., Gater, S., Hughes, D., Kent, D., Powell, D., Price, B., Wells, P.: Approaches to teaching energy. Leeds: Centre for Studies in Science and Math. Education/Univers. of Leeds, 1987
g7,P,EN

Brook, A.: Designing experiences to take account of the development of children's ideas: an example from the teaching and learning of energy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 49-64
g7,P,EN

Carr, M., Kirkwood, V., Newman, B.: Energy in three New Zealand secondary school junior science classrooms. Working Paper No.307, University of Waikato, Learning in Science Project, 1987, 1-19
g7,P,EN

Kirkwood, V., Carr, M., Gibb, S.: Energy in New Zealand secondary school junior science classroom, case study A. Working Paper No.304, University of Waikato, Learning in Science Project, 1986, 1-130
g7,P,EN

Kirkwood, V., Carr, M., Stonyer, J.: Energy in New Zealand secondary school junior science classroom, case study B. Working Paper No.305, University of Waikato, Learning in Science Project, 1987, 1-153
g7,P,EN

Kirkwood, V., Carr, M., Shaw, J.: Energy in New Zealand secondary school junior science classroom, case study C. Working Paper No.306, University of Waikato, Learning in Science Project, 1987, 1-115
g7,P,EN

Simpson, M., Arnold , B.: Diagnosis in action. Aberdeen: Aberdeen College of Education, 1984
g6,g7,P,EN,AT,B

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENTS' NOTIONS INTO ACCOUNT

P/ ENT,FLD,INF,IRR,MAC,Q,R,S,STAT / CTL,CSC,STS:
Bereich der Physik / Sonstige
area of physics / others

Genin, C., Pellet, A., Michaud-Bonnet, J.: Structuration mathematique des representations des eleves scientifiques a propos des grandeurs physiques vectorielle. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 112-116
g6,g7,P

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle, 1987
g1,g3,g5,g6,g7,P,C,B

Niedderer, H.: Alternative frameworks of students in mechanics and atomic physics.Methods of research and results. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 335-345
g6,g7,P,M,Q,CSC

Wesley, W.: Toward a cognitive physics course. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 576-580
g7,P

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENTS' NOTIONS INTO ACCOUNT

C: Bereich der Chemie
area of chemistry

Cachapuz, A.F., Maskill, R.: Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. Intern.Journal of Science Education 9, 4, 1987, 491-504
g5,g6,g7,C,P,T

Feldsine, J.E.: Distinguishing student misconceptions from alternative frameworks trough the construction of concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 177-181
g6,g7,P,C,M

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle, 1987
g1,g3,g5,g6,g7,P,C,B

Treagust, D.F.: An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 512-522
g5,g6,g7,P,C,B,AS

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENTS' NOTIONS INTO ACCOUNT

B: Bereich der Biologie
area of biology

Arnold, B., Simpson, M.: Concept development and diagnostic testing - osmosis in "o" grade biology. Aberdeen: Aberdeen College of Education, 1982
g7,B

Barenholz, H., Tamir, P.: The design, implementation and evaluation of a microbiology course with special reference to misconceptions and concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 1987, 32-45
g7,B

Giordan, A., Vecchi, G. de: Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle, 1987
g1,g3,g5,g6,g7,P,C,B

Happs, J.C., Scherpenzeel, L.: Achieving long term conceptual change using the learners prior knowledge and a novel teaching setting. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 172-181
g6,g7,B

Ryman, D.: The relative effectiviness of teaching methods on pupils' understanding of the classification of living organisms at two levels of intelligence. Journal of Biological Education 8, 1974, 219-223
g7,B

Ryman, D.: Teaching method, intelligence and gender factors in pupil achievment on a classification task. Journal of Research in Science Teaching 14, 1977, 401-409
g7,B,GEN

Schall, V.T., Jurberg, P., Boruchovitch, E., Felix-Sousa, I.C., Rozemberg, B., Vasconcellos, M.C.: Health education for children, developing a new strategy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 390-403
g6,g7,g8,B

Simpson, M., Arnold , B.: Educational psychology and the teaching of specialist subjects. Scottish Educational Review 14, 2, 1982, 109-117
g6,g7,B

Simpson, M., Arnold , B.: Diagnostic tests and criterion-referenced assessment: their contribution to the resolution of pupil learning difficulties. Programmed Learning and Educational Technology 20, 1, 1983, 36-42
g1,g6,g7,B

Simpson, M., Arnold , B.: Diagnosis in action. Aberdeen: Aberdeen College of Education, 1984
g6,g7,P,EN,AT,B

Simpson, M., Arnold, B.: Readings on learning difficulties in secondary school science - reprints from ACE biology newsletter. Aberdeen: Aberdeen College of Education, 1986
g6,g7,B

Stepans, J., Dyche, S.: Using the personal interview to determine student misunderstandings in science and some suggestions for alleviating those misunderstandings. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 466-480
g6,g7,P,M,B

Stewart, J., Streibel, M., Collins, A.: Computers as tutors: Mendel as an example. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 477-489
g7,B

Treagust, D.F.: An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 512-522
g5,g6,g7,P,C,B,AS

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENTS' NOTIONS INTO ACCOUNT

Sonstige
others

Alvarez, M.C., Risco, V.J.: Using vee diagrams to clarify third-grade students' misconceptions during a science experiment. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 1987, 6-14
g5,g7

Brody, M.J.: A programmatic approach to teaching and learning about students understanding of science and natural resource concepts related to environmental issues. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 67-80
g6,g7,STS

Driver, R.: Promoting conceptual change in classroom settings: the experience of the children's learning in science project. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 97-107
g1,g7

Fowler, T.W., Bou Jaoude, S.: Using hierarchial concept/proposition maps to plan instruction that addresses existing and potential student misunderstandings in science. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 182-186
g1,g7,g9

Fraser, K., Edwards, J.: Concept maps as reflectors of conceptual understanding. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 187-192
g5,g7

Gil, P.D.: Differences entre "modeles spontanes", modeles enseignes et modeles scientifiques; quelques implications didactiques. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 1987, 118-121
g1,g7

Glynn, S., Britton, B.K., Semrud-Clikeman, M.: Analogical reasoning and problem solving in science textbooks. In: Glover, J.A., Ronning, R.R., Reynolds, C.R.: Handbook of creativity: assessment, research and theory. New York: Plenum, 1987
g1,g7

Gunstone, R.F., White, R.T.: Assessing understanding by means of venn diagramms. Science Education 70, 2, 1986, 151-158
g7

Krajcik, J.S., Lunetta, V.N.: A research strategy for the dynamic study of students' concepts using computer simulation. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 297-301
g7

Kuhn, C., Aguirre, J.: A case study an the "journal method", a method designed to enable the implementation of constructivist teaching in the classroom. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 262-274
g1,g5,g7

McCasland, M.: Engagement in learning, resistance to schooling: some implication of conceptual teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 311-321
g7,GEN

Osborne, J., Squires, D.: Learning science trough experiental software. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 373-380
g7

Sieben, G.: Introducing concept mapping in the day to day science curriculum. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 436-446
g7

Simmons, P.E.: Misconceptions of experts and novices during a genetics computer simulation. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 447-461
g7

Simpson, M.: Diagnostic assessment and its contribution to pupils' learning. In: Brown, S., Munn, P.: The changing face of education 14 to 16: curriculum and assessment. : NFER-Nelson, 1985, 69-81
g1.g7

g8 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON LEHRERN

INVESTIGATIONS OF TEACHERS' NOTIONS

Amah, C.O.: Misconceptions in science amongst nigerian science teachers and students. In: Riquarts, K.: Science and technology education and the quallity of life. Kiel: IPN-Materialien, 1987, 321-330
g6,g8,P,E,M

Baird, J., Mitchell, I.: Improving the quality of teaching and learning - an Australian case study. Melbourne: The Monash University Printery, 1986
g1,g6,g8,g9,CTL

Benson, G.D.: Open-endness in the empirical analytic mode: one conception of scientific progress. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 59-66
g1,g6,g8,CSC

Brickhouse, N.W., Bodner, G.M., Neie, V.N.: Teachers beliefs about science and their influence on classrom practice. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 34-48
g8,CSC

Feher, E., Rice, K.: A comparison of teacher student conceptions in optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 108-117
g6,g8,P,O

Gorodetzky, M., Gussarsky, E.: The role of students and teachers in misconceptualisation of aspects in chemical equilibrium. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 187-193
g6,g8,C

Heller, P.: Use of core propositions in solving current electricity problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 1987, 225-235
g6,g8,P,E

Hesse, J.J.: The costs and benefits of using conceptual change teachings methods: a teachers' perspective. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 194-210
g1,g8,CTL

Hewson, P.W., Hewson, M.G.: Science teachers' conceptions of teaching: implications for teacher education. Intern.Journal of Science Education 9, 4, 1987, 425-440
g8,CTL,g9

Hewson, P.W., Hewson, M.G.: Identifying conceptions of teaching science. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 182-193
g8,CTL

Johnston, K.: Changing teacher's conceptions of teaching and learning. Paper prepared for BERA conference on teachers' professional learning at the university of Lancaster, 1987
g8,CTL

Lederman, N.G., Zeidler, D.L.: Science teachers' conceptions of the nature of science: do they really influence teaching behavior?. Science Education 71, 5, 1987, 721-734
g8,CSC

Schall, V.T., Jurberg, P., Boruchovitch, E., Felix-Sousa, I.C., Rozemberg, B., Vasconcellos, M.C.: Health education for children, developing a new strategy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 390-403
g6,g7,g8,B
Smith, D.C.: Primary teachers' misconceptions about light and shadows. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 461-476
g8,P,O

g9 VORSTELLUNGEN UND LEHRERBILDUNG

NOTIONS AND TEACHER TRAINING

Anderson, W.C., Belt, B.L., Gamalski, J.M., Greninger, J.E.: A social constructivist analysis of classroom science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 11-24
g1.g5.g9

Baird, J., Mitchell, I.: Improving the quality of teaching and learning - an Australian case study. Melbourne: The Monash University Printery, 1986
g1.g4.g6.g9,CTL

Cohen, M.R.: Interview studies in teacher education. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 74-76
g9

Flick, L.: Preservice teachers conduct structured interviews with children to improve instructional methods. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 133-137
g9

Fowler, T.W., Bou Jaoude, S.: Using hierarchial concept/proposition maps to plan instruction that addresses existing and potential student misunderstandings in science. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 1987, 182-186
g1.g7.g9

Hewson, P.W., Hewson, M.G.: Science teachers' conceptions of teaching: implications for teacher education. Intern.Journal of Science Education 9, 4, 1987, 425-440
g6,CTL,g9

Hills, G.L., McAndrews, B.: David Hawkins critical barriers and the education of elementary school science teachers. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 210-223
g1.g2.g9

Jones, B.: Primary school teacher education and alternative conceptions in science. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 233-236
g9

Kuehn, C., McKenzie, D.L.: Finding out what kids know or "straight from the horse's mouth". In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 260-261
g9

MacKinnon, A.M.: Toward a conceptualization of a reflective practicum in science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 301-318
g9

Richardson, M.: Teachers as learners: images from the past and implications of a (generative) constructivist perspective for the future. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 1987, 378-389
g1.g9

AUTORENREGISTER TEIL I UND TEIL II

Die Zahlen im folgenden Register weisen auf die Seiten hin, auf denen Artikel des betreffenden Autors genannt sind.

AUTHORS' INDEX PART I UND PART II

The figures in the following list indicate the pages on which articles of the referring authors are to be found.

A

Aalst, H.v. 41,95
Abdel-Wahab, M.C. 77
Abdeljabbar, M. 107
Abdullah, K.B. 143
Ackermann, K. 49
Aebli, H. 3
Adeniyi, E.O. 136
Adey, P. 113
Aguirre, J. 77,116,122,163
Aiello-Nicosia, M.L. 77
Alanach, D. 149
Albert, E. 3,49
Albrecht, E. 27
Allen, R.D. 3
Alvarez, M.C. 121,153
Ameh, C.O. 41,53,65,89,110
 124, 126,156
Amir, R. 121,126,136
Anderson, J. 4,64,98
Anderson, M. 121,149
Anderson, N.H. 23
Anderson, R.D. 89
Anderson, W.C. 3,60,66,65
 87,100,106,113,167
Andersson, B.R. 3,41,49,53
 65,81,89,
Angus, J.W. 86
Appleton, K. 49
Arca, M. 3
Archenhold, F. 53
Arnaudin, M.W. 65,107
Arnold, M. 146
Arnold, B. 88,117,127,132,
 141,148,
 149,151
Arons, A.B. 53,98,104
Arzi, H. 81
Asher, R.C. 142
Askham, L.R. 136
Aufschnaiter, S.v. 41
Augustoni, M. 140
Ault, C.R. 32,68,113,121
 129,133
Auman, J. 108

B

Bach, S. 27
Baird, J. 108,113,143,165,
 167
Banholzer, A. 77
Bar, V. 121,126
Barbetta, M.G. 53,73
Barbour, B. 113
Barboux, M. 61
Barenholz, H. 161
Barke, H.D. 68,81,134
Barker, M. 65
Barras, R. 86
Barrow, L.H. 133
Barth, N. 66
Barz, W. 32,72
Bayer, H.J. 68,77
Bayrhuber, H. 7,34,62
Beilin, H. 3
Bell, B. 6,16,27,32,49,86
 103,106,121,136
Belt, B.L. 113,167
Benson, G.D. 113,143,165
Ben-Zwi, R. 121,134
Berge, O.E. 53
Berkovitz, B. 61,97
Bernasconi, M. 137
Bernstein, A.C. 136
Bever, T.G. 14
Beverridge, M. 49
Berzonsky, M.D. 136
Billeh, V.Y. 136
Bishop, B.A. 65
Black, D. 124
Black, P. 46,73,77,103,104
Bleichroth, W. 68,89
Bliss, J. 32,73,77,89
Blosser, P. 113
Blum, L.H. 136
Blumör, R. 66
Bodner, G.M. 3,143,165
Boeha, B.B. 126
Boekaerts, M. 32
Borghi, L. 66
Bormann, M. 77
Born, G. 27,68,89
Boruchovitch, E. 140,161,
 166
Bou Jaoude, S. 114,163,167
Boundy, K. 68
Bouvens, R.E. 129
Bovet, M. 10
Bowbal, D. 140
Bower, G.H. 10
Bowd, A.D. 136
Bowman, D. 136
Boyd, C.A. 89
Bradly, C. 107
Brämer, R. 77
Brainerd, C.J. 3,20
Brand, K.J. 49
Brauner, R. 41,49
Brewer, W.F. 131
Brickhouse, N.W. 166
Briggs, H. 49,68
Brinkmann, H. 84
Britton, B.K.116,163
Brody, M.J. 141,143,163
Brook, A. 49,68,73,85,149
Brook, V.G. 37,92
Broudy, H.S. 3
Brown, A.L. 3
Brown, D.E. 126,146
Brown, G. 4
Browne, C.E. 60
Bruhn, J. 4
Brumby, M.N. 65,86
Buchweitz, B. 124
Buck, P. 32,81
Buell, R.R. 81
Busch, T.V. 44
Buthig, W. 81
Butts, W. 41
Böhme, G. 24,25

C

Cahn, A.D. 5,64
Cachapuz, A.P. 121,126,
 134,145,150
Cailiot, M. 32,41
Calafate, L.C. 86
Calderhead, J. 121
Callsen, H. 98
Canay de Mendez, A.M. 87
Caral, P. 86
Caramaza, A. 53
Caravita, S. 121,136
Carey, S. 4,25,26,79
Carr, M. 32,42,95,103,119
 134,149
Carracosa, A.J. 5,114

Cartelli, A. 81
Carter, C. 143
Case, R. 4
Cassels, J.R.T. 27
Castle, F. 53
Cauzinille-Marmeche, E. 89
Chalouhi, E. 4,32,41,42
Chaiklin, S. 117
Champagne, A.B. 4,5,9,32,63,64,68,81,98,113
Charles, D.C. 139
Chayoth, R. 138
Chi, M.T.H. 5
Chipman, H.H. 5,29
Cho, H.-H. 86
Clamann, Y.H. 137
Claus, J. 65,100
Claxton, G.L. 5
Cleare, C. 107
Clement, J. 5,25,33,43,54,89,146,148
Clinchy, B. 42
Closset, J.L. 42,96
Cochaud, G.A.M. 33
Cohen, M.R. 42,95,157
Cole, H. 54
Coles, B. 113
Collins, A. 93,137,141,152
Confrey, J. 5,33,113
Cooke, B. 1o8
Cosgrove, M. 5,33,42,54,60,95,107
Conn, J.H. 137
Consoli, V. 136
Cowan, P.A. 136
Cox, D.L. 57
Cros, D. 68,81
Curran, T.E. 57

D

Dahlgren, L.O. 90
Dahlmann, W. 68
Dahncke, H. 33,54,73
Danusso, L. 124
Daumenlang, K. 77
Davidson, J. 149
Davidson, D. 137
Dawson, C.J. 5,19,61,109
De Ambrosis, A. 55
De Carcer, I.A. 5
De Jong, T. 43
De Lannoy, J. 61,75
Deadman, J.A. 86
Deneby, J.A. 137
Dekkers, J. 6,107
Delacote, G. 33,48,50,51,66,67
Deluca, F.P. 90
Denicolo, P. 122
Dennis, W. 90,140
Dentici, O.A. 56
Desena, A.T. 4
Desforges, C. 4
Di Sessa, A.A. 6,42,56,107
Dibar Ure, C.M. 56
Dinter, K. 49
Donovan, M.P. 3
Doran, R.L. 90
Dow, A. 149
Dreyfus, A. 24,137
Driver, R. 6,33,49,50,56,58,68,73,81,86,90,107,113,128,137,149,153
Drozd, L. 27
Dubay, J. 108
Dufresne, R. 128,146
Duit, R. 7,27,33,41,42,43,49,54,55,56,57,73,74,75,77,98,114,119,122
Duncan, I.M. 82
Dunn, C.S. 33,44,95,96,107
Dupre, F. 56,61
Dyche, S. 63,127,141,147,152

E

Easley, J.R. 6,7,34,90
Eaton, J.F. 65,100
Ebinghaus, H. 44
Edwards, J. 122,153
Eger, M. 114
Ekeland, P. 69
Eijkelhof, M.C. 133
Elliot, G.S. 37,92
Ellerton, N.F. 121,134
Ellerton, H.D. 134
Elsom, B. 142
Enge, M. 69
Engel, E. 66
Engel Clough, E. 49,50,56,86,97,125,126,137
Engelhardt, P. 11,34,50,56,58,98,100
Engström, Y. 86,137
Ennenbach, W. 104,106
Erätuuli, M. 50,125
Erickson, G.L. 6,7,33,34,50,77,87,97,108
Erle, G. 43
Esgalhado, A. 129
Escant, A. 67
Evans, J.D. 137
Eylon, B.S. 42,56,121,

F

Fallon, A.E. 137,140
Faucher, G. 43,56,78,114
Fedra, D. 20,118,125
Feher, E. 34,65,100,129,156
Feldsine, J.E. 34,126,134,146,150
Felix-Sousa, I.C. 140,151,156
Feltovich, P.J. 5
Fensham, P.J. 7,8,22,39,90
Ferguson-Hessler, M. 43
Fernandez Perez, J. 138
Fillbrand, H. 41
Finegold, M. 104,148
Finley, F.N. 34,50,90,143
Fischbein, E. 119,126
Fisher, K.M. 7,86
Fladt, R. 82
Flavell, J.H. 7
Fleshner, E.A. 56
Flick, L. 157
Fowler, T.W. 114,153,157
Frankl, D.R. 136
Fraser, K. 122,153
Fredette, N.H. 34,43,146
Freitas, M. 135,141
Frey, K. 7,34,82
Freyberg, P. 8,16,21,27,32,37,106,107,109
Friedler, Y. 126
Friedman, A. 93

Purio-Mas, C. 24,130
Puschini, E. 66

G

Gabel, D.L. 5
Gagliardi, M. 62
Gagliardi, R. 74,87
Gal-Choppin, R. 88,142
Gallagher, J.J. 114
Gamalski, J.M. 113,167
Ganiel, U. 42,56,124
Gans, A. 13
Gardosh, R. 127
Garnett, P.J. 82,83,90
Garrard, J.E. 39,86
Gartley, W. 137
Gater, S. 149
Gates, L. 90
Gauld, C. 8,43,95,119
Gayford, C.G. 74
Gellert, E. 137
Genet, M.-F. 74
Genin, C. 133,160
Gennaro, E.D. 56,82
Gentner, D. 47,43
George, J. 143
Gerace, W. 146
Gerlach, W. 27
Gertzog, W.A. 18
Ghiglionne, R. 67
Giami, S. 116
Giani, U. 144
Gibb, B. 149
Giese, P.A. 126
Gil, P.D. 8,24,114,119,
153
Gilbert, J. 8,17,34,37,38,
43,56,57,60,65,68,74,82,
86,90,114,116,122,132
Gillespie, J.P. 137
Giordan, A. 9,86,106,114,
116,119,122,129,133,
134,137,138,150,161
Gipper, H. 28
Glaser, R. 5
Glasersfeld, E.V. 8
Glasgow, J. 143
Glatzel, D. 83
Gliner, G.S. 34

Glynn, S.116,163
Göbel, R. 28
Goffman, E. 8
Gohmert, B. 96
Goldberg, F. 35,65,66,100,
148
Göritz, J. 78
Gorodetzky, M. 36,57,82,
134,155
Gowin, D.B. 8,32,37,68,115
Graham, I. 90,138
Grant, B.A. 138
Green, B. 53
Green, P. 70,101
Greeno, J.G. 8
Greminger, J.E. 113,167
Griffiths, A.K. 106,138
Griffiths, K.M. 87,108
Grimellini Tomasini, N.
56,108,125,145
Grob, K. 146
Grossl, M.C. 55
Grützmann, F. 68,82
Guesne, E. 6,36,66,90,
100,107
Guidoni, P. 3,9
Gunstone, R.P. 4,9,15,32,
35,41,53,54,57,86,87,96,
98,108,110,163
Gussarsky, E. 36,82,134,166

H

Hackling, M. 87,82,136
Hagstedt, H. 81,90
Halbwachs, F. 21,26,54,
55,61
Hall, G.S. 50,82
Halliden, O. 90,116,136
Halloun, J.A. 67
Hamida, J.B. 43
Hamlyn, D. 24,50
Hannaway, O. 28
Haney, R.E 122,138
Happs, J.C. 91,108,138,161
Hardiman, P.T. 146
Harel, G. 126
Harlen, W. 91
Härtel, H. 96
Hartfree, W.E. 115

Hashweh, M.Z. 9
Haslam, F. 68
Hauke, B. 43,53,96
Haupt, G.W. 78
Haupt, P. 82
Haury, D.L. 16,93
Häusler, B. 20
Häusling, A. 10,29,108
Häussler, P. 10
Hayes, J.R. 9,20
Hawkins, D. 9
Hawkins, J. 115
Head, J. 9,35,115
Heege, R. 9,25,28,44,78,93
Heepmann, B. 91
Heinrich, P. 69
Heisenberg, W. 28
Heisl, W. 66
Heller, B. 28
Heller, P. 124,155
Helm, H. 9,35,78,91
Henckell, H. 9
Hendrick, K. 139
Henle, P. 28
Henningsen, J. 108
Hernandez-Perez, J. 130
Herron, J.D. 10,82
Hesse, J.J. 116,166
Hestenes, D. 67
Hewson, M.G. 10,24,28,60,
67,98,109,165,167
Hewson, P.W. 10,36,57,78,
98,156,167
Hibbard, K.M. 69
Hickman, F.M. 138
Hilbert, M. 78
Hildebrand, A.C. 138
Hilgard, E.R. 10
Hill, D. 91
Hills, G.L. 10,116,118,167
Hobbs, E.D. 87
Hodgson, G.H. 83
Hoffmann, K. 36,66,100
Hojnacki, S.K. 57
Holding, B. 83
Holls, E. 44
Hollon, R.E. 50
Höpp, G. 29
Howe, A. 71

Hoz, R. 32,35,57,82,122,126,138
Huang, J. 91
Huber, G.L. 10
Hubermann, A.M. 37
Hübner, K. 29
Hughes, D. 149
Humboldt, W. V. 28

I

Inbody, D. 91
Inhelder, B. 10,17,78,79,91,93
Isa, A.M. 35
Ivowi, U.M. 78,126,132

J

Jaeckel, K. 49,57
Jahoda, G. 138
Jaide, W. 91
Janetzki, V. 44
Janke, D.L. 137
Jay, B. 90
Jeneiten-Allkofer, C. 7,34,57,74,82
Jenkins, E.W. 10
Jimenez Aleixandre, M.P. 138
Jochems, W. 35
Johansen, G.T. 37
Johansson, B. 10,36
Johnson, C.N. 91,139
Johnson, P.E. 91
Johnson-Laird, P.N. 22
Johnston, K. 155
Johnstone, A.H. 27,50,82,83
Joshua, S. 44,95,96
Jones, B. 126,131,157
Jones, G. 63,99
Jones, O.E. 63
Jordaan, A.S. 115
Jordan, J. 44
Jung, W. 7,10,11,12,24,26,29,33,35,36,42,44,50,56,57,58,65,66,67,95,96,98,99,101,103,106,122,129
Jungwirth, E. 137,139,143
Jurberg, P. 140,151,156

K

Kahle,J.B. 86
Kahn-Gandapur, T.H. 37,92
Kainz, F. 29
Kamlah, W. 29
Kane, B. 139
Kanner, L. 137
Kargbo, D.B. 87
Kariotoglou, P. 68
Karmiloff-Smith, A. 91
Kärrquist, C. 36,44,45,65,67,124
Kass, H. 68,84
Keating, D.P. 12
Kelly, P.J. 86
Kempa, R.F. 12,36,83
Kendall, D.C. 140
Kenealy, P. 120,127
Kennedy, M.H. 138
Kent, D. 149
King, W.H. 91,143
Kinnear, J.F. 87,106,139
Klowski, I. 44,96
Kircher, E. 44,58,69
Kirkwood, V. 103,149
Kitagawa, O. 29
Klaassen, R. 133
Klemmer, G. 63
Klima, R. 106
Kilx, F. 12
Klopfer, L.E 4,5,12,32,63,98,106,
Kluwe, R. 20
Knote, H. 69
Kohl, D. 59
Kojima, M. 29,59
Kollopoulos, D. 58,74
Köhnlein, W. 14
Konold, C.E. 76
Koumaras, P. 45
Kovacs, L. 58
Krajcik, J.S. 153
Krause, H. 106
Kreitler, H. 139
Kreitler, S. 139
Kriel, J.R. 108
Kubli, F. 12,29,36,58,71
Kuehn, C. 157
Kuethe, L.J. 91
Kuhn, C. 115,122
Kuhn, D. 92
Künzli, R. 12
Kurlich, K. 93

L

Lamb, C.E. 12
Lambert, P. 68
Lang, M. 7
Larkin, J.H. 12,13,36,68
La Rosa, C. 67
Lawrenz, F. 110
Lawson, R.A. 127,132
Lazarowitz, R. 139
Leadbeater, B.J. 131
Leboutet-Barrel, L. 58,69
Lee, K.-W. 83
Leeds, M.J. 87
Lederman, N.G. 155
Lefevre, R. 67,129
Lehner, H. 13
Lehrke, M. 7,34,82
Levin, I. 127
Levine, S.H. 70
Licht, P. 45,96,145
Lie, S. 62,59
Lightman, A.P. 131
Lijnse, P. 133
Lin, H. 13,24
Linder, C.J. 133
Linke, R.D. 78
Linn, M. 18,92,145
Lippert, R. 116
Lipson, J.I. 7
Loch, W. 29,30
Lochhead, J. 13,43,108
Löffler, G. 14,59
Logan, P. 29
Longden, B. 87
Looft, W.R. 139
Lorenzen, P. 29
Loria, A. 53,73
Lott, G.W. 13
Lovell, K. 13,45,59,92
Lowell, W.E. 143
Lucas, A.M. 36
Lunetta, V.N. 153
Lunzer, E.A. 13
Luther, W. 29

Lybeck, L. 13,14,59,78,83, 92
Lynch, P.P. 92,131
Lythoth, J. 14,25

M

MacGuire, P.R. 122
Machold, A. 78
MacKinnon, A.M. 157
Mahadeva, M.N. 14
Maichle, U. 14,37,45,96
Mali, G.B. 71
Malone, J. 107
Malony, D.P. 14,59,78,104, 116,143
Ma-Naim, H. 126
Mans, C.
Manthei, U. 50,51,59,75,78, 79
Marcus, W. 101,106
Marek, E.A. 139
Martin, F.L. 139
Martin, M.D. 139
Martins, I.P. 134
Marton, F. 10,14,37,83,90
Mascellani, V. 53,73
Masillo, S. 144
Maskill, R. 36,37,134,145, 160
Massara, C.I. 55
Matalon, B. 67
Matthews, G.P. 37,92
Matthews, M.R. 119
Maurer, A. 139
Maurin, M. 68,81
Maurines, L. 127
Mayer, M. 14,51,67,76,92, 118,127,131
Mayer, R.E. 14
Mazzoli, P. 3
McAndrews, B. 115,157
McCasland, M. 154
McChesney, J. 103
McClelland, J.A.G. 14,59,75
McCloskey, M. 53,59
McDermott, J. 12
McDermott, L.C. 34,50,51, 59,63,65,66,79,96,97, 100,127,132,133,146
McDonald, J.J. 60,83
McInerny, J.D. 138
McIntyre, P.J. 45
McKenzie, D.L. 157
McManus, P. 36
McNaught, C. 116, 120
Megarity, M.T. 122,127
Meheut, M. 24,54,68,81,83,89
Mehl, M.C. 14
Mehler, J. 14
Mendez De Gagliardi, M. 87
Menis, J. 83
Merkle, D.G. 139
Merten, S. 24
Mestre, J. 128,146
Mibiol, K.S. 92
Michaud-Bonnet, J. 133,150
Michelini, M. 53,73
Miles, M.B. 37
Milkent, M.M. 92,108
Millar, R. 145
Miller, A.G. 15
Miller, J.D. 131
Minstrell, J. 990
Mintzes, J.J. 39,86,87,107, 139,142
Mitchell, I. 108,113,143, 166,167
Monk, M. 32
Moore, J.E. 140
Moreira, M.A. 37,51,122,124
Mori, I. 29,59
Mothes, H. 15,92
Murphy, P. 92
Murray, D. 60,87,140
Murray, T. 146

N

Nachtigall, D. 15,60,99
Nagy, M.H. 37,140
Narode, R. 60
Naumer, H. 29
Nay, U. 29,83
Nele, V.N. 166
Neuberger, H.T. 143
Newman, B. 149
Nguyen-Lin, M. 86
Nicholls, C.E. 36
Nicholson, J.R. 69
Niedderer, H. 15,41,45,54, 62,73,116,127,133,146,160
Niegemann, H.M. 15
Nielsen, H. 60,79
Noce, G. 56,60,67,71,87
Nordland, F.H. 86
Norman, D.A. 15
Normore, G. 108
Northfield, J.R. 9,15,108
Novak, J. 9,15,16,32,37,60, 68,69,71,91,108,116,120, 121,122,126,127,129
Novick, S. 109
Nussbaum, J. 16,25,69,79, 101,102,109,116
Nussionovitz, R. 88,142
Nöding, S. 69

O

Oakes, M.E. 16,93
Oerter, R. 16
Ogar, J. 71
Ogborn, J. 16,37,60,73,146
Ogunniyi, M.B. 131
Okeke, E.A.C. 87
Oldham, V. 6,45,47
Olstad, R.G. 16,93
Oludotun, J.S. 126,132
Ondrako, M.A. 136
Osborne, J. 121,154
Osborne, R. 5,8,16,32,33,34, 37,38,42,43,47,54,567,60, 67,70,90,95,96,99,101, 103,107,109,116,129
Overkamp, M. 84
Oxenham, J. 134

P

Pacca, J.L.A. 133
Pachaury, A.C. 39,93
Paoloni, L. 17
Pascual-Leone, J. 17
Patrizi, P. 67
Pauli, W. 10
Pea, R.D. 116
Peard, T.L. 109
Pecori Balandi, B. 56,145
Pella, M.O. 79,83,136

Pellet, A. 133,160
Pereira, D. 37
Perkins, D.N. 116
Peters, A. 41
Peters, P.C. 41,46,60
Peterson, R. 93
Pfuhl Rodrigues, D.M.A. 79
Pfundt, H. 7,11,29,30,34,69,70,82,84,101,106
Phelps, H. 92
Phinlos, D. 99
Piaget, J. 10,17,26,61,78,79,93
Pines, A.L. 17,22,30,36
Placek, W.A. 127
Pliner, P. 137
Pope, M. 17,22,116,122,132
Popp, B.D. 51,97
Popp, R. 79
Porter, C.S. 140
Posner, G.J. 18,21,38
Powell, D. 149
Prawat, R. 142
Preece, P.F.M. 18,26,38,46,61,71,93
Price, B. 149
Prout, A. 87
Prüm, R. 46
Psillos, D. 46,68
Pulos, S. 13,18,62,72,93

Q

Quiggin, V. 140

R

Raat, J. 63,99
Radford, T. 88
Raghubir, K.P. 18
Rafel, J. 127
Raichvarg, D. 86
Rainard, B. 36
Rang, O. 30
Ranney, M. 146
Rapoport, A. 30,61
Rasilla, C. 86
Raspe, C. 93
Raven, R. 54,61
Rebordao, J. 129
Reddon, M.G. 91
Redeker, B. 18,34
Reed, J.L. 15
Reesink, C. 131
Reichwein, A. 83
Reif, F. 18,19
Reimann,P. 20
Reiner, M. 104,148
Renner, J.W. 19,62
Rennström, L. 81,89,123,130,134
Resnick, L.B. 19,57
Reul, H. 11,57,98
Rhöneck, Ch.von 11,33,42,46,56,61,70,76,96,124,146
Rice, K. 34,66,100,129,166
Rice, P. 87
Richardson, E. 79
Richardson, M. 116,157
Riechard, D.E. 140
Riesch, W. 32,70,77
Riley, M.S. 8,19,46
Ringnes, V. 136
Risco, V.J. 163
Robertson, W.W. 79
Rogan, J.M. 146
Rogers, W.P. 93
Rosenquist, M.L. 61,79,97,146
Rosenthal, K. 5
Ross, K.A. 19
Rost, J. 19
Roth, C. 117
Roth, K.J. 87
Rouchier, A. 21,26
Rowell, J.A. 61,109
Rozemberg, D. 140,151,166
Rozin, P. 137,140
Ruggiero, S. 61
Rumelhart, D.E. 15
Rumpf, H. 24
Rusca, G. 136
Russel, D.H. 19
Russell, R.W. 140
Russel-Gebett, J. 140
Ryman, D. 140,151

S

Sachsse, H. 24
Sadler, P.M. 131
Safier, G. 140
Säljö, R. 114,117,122
Saltiel, E. 26,61,83
Salyachivin, S. 61
Sanford, J.P. 88,106
Santos, C.A. 37,61
Savage, M.M. 19
Schaefer, G. 19,30,75,79,88,110
Schäfer, K. 20,38,62,79
Scharf, V. 84
Schall, V.T. 140,151,166
Schecker, H. 20,61,62
Schenk, B. 62,76,79
Scherpenzeel, L. 136,151
Schilder, P. 141
Schilling, P. 47,96
Schmidt, H.J. 84,136
Schmidt French, B. 88,106
Schofield, B. 92
Schollum, B. 70,101
Schön, L. 20,118,119
Schönherr, J. 61
Schulte, W. 30,46,93
Schultz, K. 146
Schuster, D.G. 38
Schwaneberg, R. 44,78,93
Schwedes, H. 11,38,47,57,96,98
Scott, P. 70,101,130,148
Scriven, E.G. 93
Searle, P. 62
Sebatie, J.M. 117
Segre, G. 62,144
Seibicke, W. 27
Seiffert, H. 30
Selley, N. J. 70,84
Semrud-Clikeman, M. 116,163
Sequeira, M. 136,141
Sere, M.G. 24,36,62,89,99
Shafer, T. 107
Shankar, N. 61
Shanon, B. 127
Sharodini-Dagan, N. 71,102
Shavelson, R.J. 38
Shayer, M. 20,61
Shaw, J. 149
Sheldon, T. 106
Shepherd, D.L. 62

Shipstone, D.M. 47,98
Shuell, T. 20,38,117
Sieben, G. 154
Siegel, L.S. 20
Siegler, R.S. 93
Siemsen, F. 67
Silberstein, J. 121,134
Simmons, P.E. 154
Simon, D.P. 12
Simon, H.A. 9,12,20
Simpson, M. 88,117,127,130,
  132,141,148,149,151,154
Sinclair, H. 10
Singer, J. 68
Sjoberg, S. 59,62
Slack, S.J. 141
Smedslund, J. 20
Smeets, P.M. 141
Smith, C.L. 71,72,79,
Smith, D.C. 156
Smith, E.L. 65,85,87,100,
  106,117
Smith, J. 17
Sneider, C. 62,72,93
Snively, G. 123,144
Solomon, C.A. 5,54
Solomon, J. 20,24,30,45,62,
  73,75,77,99,103,106,117,
  120,144
Spada, H. 20
Sperandeo-Mineo, R.M. 77
Spreckelsen, K. 20,21,30,
  35,39,80,90,93
Springfeld, U. 47
Squires, D. 4,154
Stachel, D. 63,84
Statkiewicz, W.R. 3
Staver, J.R. 5
Stavy, R. 61,63,93,97,126,
  141,144
Stead, B. 67,75,129,141
Stein,J.S. 145
Steinberg, M.S. 47,98
Stengl, D. 51
Stenhouse, D. 21,30
Stepans, J. 63,127,141,147,
  152
Stewart, J. 21,34,39,152
Stevens,A.L. 93
Stilwell, S. 141
Stonyer, J. 149
Stork, E. 65,96,100
Stork, H. 119
Strauss, M.J. 70
Strauss, S. 21,51,97
Streibel, M. 141,152
Strike, K.A. 18,21,117
Strnad, J. 21
Strusberg, S. 87
Strömdahl, H. 83
Stuart, H. 39,45,47
Stückrath, F. 21,84
Suarez, A. 21
Subbarini, M.S. 88
Sumfleth, E. 123
Sujak-Lesz, K. 63
Sutton, C. 21,35,39,93
Svensson, L. 10,35
Swan, M. 51,63
Swartz, C.E. 70
Swift, D.J. 8
Swingler, D.G. 90
Symington, D. 15,88,108
Szekely, L. 21
Szeminska, A. 61

T

Tadang, N. 29,59
Tait, C.D. 142
Tamir, P. 21,88,128,136,
  142,151
Tan, S.K. 154
Targan, D.S. 131,140
Tasker, R. 16,21,22,47,96,
  109,117,144
Taylor, R. 68
Tenney, Y. 47
Terry, C. 63,99
Theman, J. 20
Thiel, S. 109
Thijs, G.D. 128
Thomas, G. 36
Thomey, K. 100
Thompson, J.J. 33
Thomsen, P. 60,79
Thorley, N.R. 124,128,145,
  147
Tiberghien, A. 6,24,35,48,
  51,66,67,74,83,90,97,107,
  117
Tobin, K. 90
Tobias, S.D. 123
Tolle-Herlyn, A. 48
Tomer, Y. 138
Tonucci, F. 136
Touger, J.S. 30,39,128
Treagust, D.F. 39,71,72,83,
  87,88,123,131,136,139,142,
  145,147,148,150,152
Trowbridge, J.E. 39,63,139
Tullberg, A. 83
Täubert, P. 51,59,75

V

Vallasiades, O. 45
Van Den Berg, J. 63,99
Vankirk, J. 38
Varela, M. 117
Vasconcellos, M.C. 140,151,
  156
Vecchi, G. de 71,86,116,119,
  122,133,134,138,150,151
Vegting, P. 104
Venz, M.I. 78
Vergnaud, G. 21,26
Vester, F. 22
Vesting, F. 63
Vicentini-Missoni, M. 22,
  56,60,61,67,72
Viennot, L. 22,26,63,64,
  80,94
Viglietta, M.L. 72
Villani, A. 133
Voelker, A.M. 79,80,83,84,
  144
Völker, B. 46
Vollmer, G. 30,31
Volmink, J.D. 14
Voorde, H.H. ten. 31,64,84,
  106
Vosniadou, S. 131
Voss, H.-P. 44
Vuilleumier, B. 125,128

W

Wachsmuth, J. 39

Wagenschein, M. 22,24,31
Wandersee, J.H. 88,123,142
Warren, J.W. 64,76
Warrington, L. 73
Wason, P.C. 22
Waterman, M.A. 22
Watts, M. 8,22,34,39,56,57,64,65,67,68,74,76,82,86,98,116,122
Webb, G. 50,83
Weber, E. 44,96,99,103
Weber, R. 27,89
Weerda, J. 64,80,84
Wechsler, D. 141
Wein, H. 31
Weinert, F.E. 22
Weisgerber, L. 31
Weizsäcker, C.F. v. 31
Welch, W.W. 76
Weil-Barais, A. 89
Wells, P. 149
Wellman, H.M. 7,91
Weninger, J. 31
Wesley, W. 150
West, L.H.T. 17,21,22,39,40,93,109
Westphal, W. 55,70,73,77
Wheeler, A.E. 22,76,84
Whitaker, R.J. 64
White, B. 64,99
White, E. 142,160
White, R.T. 4,23,22,35,40,63,57,153
Whorf, B.L. 31
Wickihalter, R. 67
Widl, M. 88
Wierstra, R.F.A. 109
Wiesner, H. 11,34,35,44,47,60,61,56,57,58,65,66,67,78,96,97,98,99,100,103
Wightman, T. 70,101
Wilkening, F. 23,84
Williams, G.T. 136
Wiser, M. 26
Wittrock, M. 16,17,23
Wolff, R. 31
Wollman, W. 117
Wood-Robinson, C. 86,87
Wubbels, T. 67
Wylam, H. 61

Z

Za'rour, G.I. 94
Zee, E.H.van 46,79,96,133
Zelewski, H.D. v. 55,73
Zeidler, D.L. 166
Zeyer, G. 84
Zietsman, A.L. 108
Zietz, K. 23,80,94
Zimmermann, M.L. 62
Zylbersztajn, A. 57,84

ADRESSENLISTE

Die Liste enthält die Adressen der Kolleginnen und Kollegen, denen wir die erste Ausgabe der Bibliographie (1985) geschickt haben. Wir fügen diese Liste an, um Kontakte zwischen den am Forschungsgebiet Interessierten zu unterstützen.

LIST OF ADDRESSES

The list contains addresses of colleagues who ordered the first edition of the bibliography (1985). We add the list in order to ease contacts between those interested in research on students' conceptions.

Dr. H van Aalst
Adviesgroep Projectecn
Postbus 1004
NL-3700 BA Zeist
Niederlande

Prof. G.S. Aikenhead
College of Education
University of Saskatchewan
Saskatoon
Saskatchewan
CANADA

Werner Altemeier
Fachleiter für Biologie
Im Ortbruch 32
D-4292 Rhede
FRG

Prof.Luiz Otavio F.Amaral
Depto. Quimica - ICEx -
UFMG
Cidade Universitaria
Pampulha
30.000 Belo Horizonte - MG
Brazil

C.W. Anderson
Assistant Professor
Michigan State University
East Lansing
MICHIGAN 48824
USA

Prof. Dr. B. Andersson
Department of Educ.
Research
University of Gothenburg
P.O. Box 1010
S-431 Mölndal
Schweden

Wolfgang Asselborn
Konrad-Adenauer-Allee 26
D-6630 Saarlouis
FRG

Dr. E.P. Atkinson
State College of Victoria
Burwood Highway
Victoria
AUSTRALIA

Prof. Dr. S. von
Aufschnaiter
Universität Bremen
FB 1 - Physik
Kufsteiner Straße
D 2800 Bremen 33
FRG

Prof. F. Bader
Studienseminar Stuttgart
Wiederholdstr. 13
D 7000 Stuttgart 1
FRG

J.R. Baird
State College of Victoria
Swanston Street
Melbourne
Victoria 3000
Australia

Dr. H.-D. Barke
Universität Hannover
FB Erziehungswissenschaften
I
Bismarckstr. 2
D 3000 Hannover 1
FRG

Lloyd Barrow
107 Townsend
University of Missouri
Columbia, MO 65211
USA

Prof. Dr. Bauersfeld
IDM Bielefeld
Postfach 8640
D 4800 Bielefeld 1
FRG

Dr. H.-J. Becker
Freie Universität Berlin
Habelschwerdter Allee 45
D-1000 Berlin 33
FRG

Prof. Dr. O.-E. Berge
PH Kiel
Institut Physik u. Didaktik
Olshausenstr. 75
D 2300 Kiel 1
FRG

E. Bittner
Universität Bielefeld
Zentrum f. Lehrerbildung
Postfach 8640
D-4800 Bielefeld
FRG

Prof. P.J. Black
King's College of London
(KQC)
University of London
Chelsea Campus
552 King's Road
London SW 10 OUA, UK

Dr. A.J. Blake
c/o Riverina C.A.E.
Wagga Wagga
N.S.W. 2650
AUSTRALIA

Mr. Beno B. Boehm
Faculty of Education
Monash University
Clayton VIC 3168
Australia

L. Borghi
Universita di Pavia
Dipartimento di Fisica
Via A. Bassi, 6
I-27100 Pavia
ITALY

Prof. Dr. M. Bormann
Ruhr-Universität Bochum
Abt. Physik u. Astronomie
Universitätsstr. 150
D 4630 Bochum 1
FRG

Prof. Dr. G. Born
Universität - GHS Duisburg
FB 10 Did. d. Physik
Lotharstr. 65, LB-Trakt
D 4100 Duisburg 1
FRG

Saouma BouJaoude
2217 Victory Pkwy D3
Cincinnati
Ohio 45206
USA

LRSchDir Hans Joachim Bruhn
Wehrbereichsverwaltung IV
Moltkering 9
D-6200 Wiesbaden
FRG

Dr. M. Brumby
Faculty of Education
Monash University
Clayton
Victoria 3168
AUSTRALIA

Prof. Dr. P. Buck
PH Heidelberg
FB 3 - Chemie
Im Neuenheimer Feld 561
D 6900 Heidelberg
FRG

Antoni Bueso
Aristides Maillol, 11, 3o
1a
ES-08028 Barcelona
SPANIEN

Dr. M. Caillot
Université Paris 7
L.I.R.E.S.P.T.
Tour 23, 2. place Jussieu
F-75251 PARIS CEDEX 05
FRANCE

Dr. Silvia Caravita
Istituto di Psicologia
del Consiglio Nazionale
delle Ricerche
Via dei Monti Tiburtini,
I-00157 Roma
Italy

Prof. Dr. David Carraher
Cidade
Universitaria Varzea
50 000 Recife - PE
Brasilien

Marino Castells
Seminari de Fisica
Escola Universitaria de
Formacio
del Professorat EGB
Calle Melar de Polan 140
ES-08014 Barcelona

Dr. A.B. Champagne
AAAS
1333 H Street N.W.
Washington D.C. 20005
USA

Dr.G. Claxton
King's College of London
University of London
Chelsea Campus
552 King's Road
London SW 10 OUA, UK

Prof. J. Clement
Department of Physics
and Astronomy
University of Massachusetts
Amherst
MA 01003
USA

Dr. M. Clements
Faculty of Education
Monash University
Clayton
Victoria 3168
AUSTRALIA

Dr. J.-L. Closset
Université Paris 7
L.D.P.E.S.
Tour 23, 2. place Jussieu
F-75251 PARIS CEDEX 05
FRANCE

P. Cobb
Purdue University
Education Building
W. Lafayette, IN 47907
USA

Dr. R. Cohen
Department of Science
Teaching
Weizman Institute of
Science
Rehovot 76 100
ISRAEL

Dr. J. Confrey
302 Shattuck Hall
Mount Holyoke College
South Hadley
MA 01075
USA

Dr. E.D. Corte
Katholieke Universiteit
Pedagogisch Instituut
Vesaliusstraat 2
B-3000 Leuven
BELGIUM

Dr. M. Cosgrove
Science Educ. Research Unit
University of Waikato
Waikato
NEW ZEALAND

Gloria D'Alba
Faculty of Education
Clayton
Victoria 3168
AUSTRALIA

Dr. W. Dahlmann
Hochschule Hildesheim
Institut f.
Naturwissenschaften
Marienburger Platz 22
D 3200 Hildesheim
FRG

Prof. Dr. H. Dahncke
PH Kiel
Olshausenstr. 75
D 2300 Kiel 1
FRG

Prof. J.C. Dancy
School of Education
St Luke's
EXETER
EX1 2LU
ENGLAND

Prof. G. Delacote
L.I.R.E.S.P.T.
Université Paris VII
2 Place Jussieu
F-75221 Paris Cedex 05
FRANCE

Dr. J. Desautels
Faculté de Sciences de
l'Education
Bureau 1034
Université Laval
Quebec G1K 7PA
CANADA

Dr. Diong Cheong Hoong
Institute of Education
469 Bukit Timah Road
Singapore 1025
Republik of Singapore

Jean Dionne
Department de Didactique
Faculte des Sciences de
l'Education
Université Laval
Quebec City, PQ
G1K 7P7 CANADA

A. Dobisch-Harbig
Auf dem Born 23
D-2807 Achim
FRG

Dr. Ana Domingos
Departamento de Educacao
Faculdade de Ciencias
Universidade de Lisboa
R. Ernesto Vasconcelos
Edificio C 1-3. Piso
1700 Lisboa, Portugal

R. Drees
Knooper Weg 94
D-2300 Kiel
FRG

Tommy Dreyfus
Weizmann Institute of
Science
Dept. of Science Teaching
Rehovot 76100
Israel

Dr. R. Driver
Centre for Studies
in Science Education
University of Leeds
LEEDS LS2 9JT
U.K.

Dr. J.-J. Dupin
Universite d'Aix-Marseille
II
Department de Physique
70, route Leon-Lachamp
F-13288 MARSEILLE CEDEX 9
FRANCE

Prof. Dr. J.A. Easley
Committee on Culture and
Cognition
Education Building
University of Illinois
Urbana Illinois 61801
USA

Prof. Dr. W. Engelhardt
Hochschule Lüneburg
Wilschenbrucher Weg 29
D 2120 Lüneburg
FRG

Dr. G. Erickson
Department of Math. and
Science Education
University of British
Columbia
Vancouver, B.C.
CANADA

Escola de Mestres Sant
Cugat
Departament Ciencies
Universitat Autonoma de
Barcelona
Campus de Bellaterra
Barcelona, Spanien

B.A. Eshun
Department of
Mathematics Education
105 Aderhold Hall
University of Georgia
Athens, GA 30602
USA

Mrs Mariona Espinet
The University of Georgia
Dept. of Science Education
Athens, Georgia 30602
USA

Prof. Dr. Alexander Even
1375 Amber Cres.,
Oakville
Ont., L6J 2P1
CANADA

Prof. P. Farwig
Universität Osnabrück
Postfach 44 69
D 4500 Osnabrück
FRG

Dr. Guy Faucher
Ecole Polytechnique
c.P. 6079 suc. A
Montreal,Quebec H3C 3A7
Canada

D. Fedra
Gesamthochschule Kassel,
FB 18
Postfach 10 13 80
D 3500 Kassel
FRG

J.E. Feldsine, Jr.
Department of Chemistry
Broome Community College
Front Street
Binghamton, NY 13902
USA

Prof. P.J. Fensham
Faculty of Education
Monash University
Clayton
Victoria
AUSTRALIA 3168

Prof. F.N. Finley
Science Teaching Center
University of Maryland
College Park 20742
USA

Prof. Dr. H. Fischler
FU Berlin, ZI 7, WE 4
Habelschwerdter Allee 45
D 1000 Berlin 33
FRG

J.H. Fischer
Simmons College
300 The Fenway
Boston
Massachusetts 02115
USA

Dr. Kathleen M. Fisher
Department of Education &
Division
of Biological Science
University of California
Davis, CA 95616
USA

Richard Frazier
Saudi Arabian International
School
c/o American Consulate
Box 8
Dhahran, Saudi Arabia

Dr. N. Fredette
Department of Physics
Fitchburg State College
Fitchburg, Mass. 01420
USA

Dr. G. Freudenthal
The Institute for the
History and Philosophy of
Science
Tel-Aviv-University
Tel-Aviv 69 978
Israel

Dr. sc. Lothar Fritsch
WB Chemiemethodik
Sektion Chemie
Wilhelm-Pieck-Universität
Buchbinderstr.9
DDR 2500 Rostock 1
DDR

Dr. R.M. Gagne
Department of Educational
Research
Florida State University
Tallahassee
Florida 32306
USA

Dr. Uri Ganiel
Department of
Science Technology
Weizmann Institute of
Science
Rehovot 76100
ISRAEL

Rosalyn Gates
Box 227, RD 3
Indiana, Pennsylvania,
15701
USA

June George
Faculty of Education
University of the West
Indies
St. Augustine
TRINIDAD. West Indies

Prof. Dr. Almut Gerhardt
Fakultät für Biologie,
Didaktik der Biologie
Universität Bielefeld
Postfach 8640
D 4800 Bielefeld 1
FRG

Dr. J.K. Gilbert
Department of Educational
Studies
Surrey University
Guildford GU2 5XH
SURREY
ENGLAND

Prof. A. Giordan
Laboratoire de Didactique
et Epist.des Sciences
Uni II - 24, rue General
Dufour
CH 1211 Geneve 4
SWISS

Joyce Glasgow
Teacher Education Dept.
Faculty of Education
University of the West
Indies
Mona, Jamaica, W.I.

Z. Golab-Meyer
Jagellion University
Institut of Physics
30 - 059 Krakow 16
Reymonta 4
POLAND

Dr. Hanna Goldring
The Weizmann Institute of
Science
Dept. of Science Teaching
Rehovot
Israel

Prof. A. Goralski
Etiduy R. 40 m.3
02-643 Warsaw
POLSKA

Dr. R. Gott
AVP, School of Education
University of Leeds
GB Leeds LS2 9JT
U.K.

Prof. B. Gowin
Department of Education
Stone Hall
Ithaca
NY 14853
USA

Pere Grapi
Latorre 62, 3 - 3
Sabadell
Barcelona
SPAIN

Dr. Frits Gravenberch
SLO
Postbus 2041
NL-7500 CA Enschede
THE NETHERLANDS

Dr. B.F. Green
Department of Psychologie
The John Hopkins University
Baltimore
MD 21218
USA

D. Greenberg
University of Alaska
School of Fisheries and
Science
11120 Glacier Highway
Juneau AK 99801
USA

Prof. J. Greeno
LRCD
University of Pittsburgh
Pittsburgh
Pennsylvania 15260
USA

Dr. Alan K. Griffiths
Department of Curriculum
and Instruction
Memorial University
St. John's
Newfoundland
Canada, A1B 3X8

Prof. K. Grob
PH Ludwigsburg
Postfach 220
D 7140 Ludwigsburg
FRG

Dr. E. Guesne
L.I.R.E.S.P.T.
Université Paris 7
2 Place Jussieu (tour
25,5e)
F-75251 PARIS CEDEX 05
FRANCE

Prof. P. Guidoni
University of Napoli
Tari 3
Napoli
ITALY

Dr. R.F. Gunstone
Faculty of Education
Monash University
Clayton
Victoria
AUSTRALIA 3168

Dr. Werner Habel
Blenkerweg 18
D-4600 Dortmund 30
FRG

Dipl.-Psych B. Händel
Neuhof 14
D-6307 Linden
FRG

Dr. Volker Hagemeister
Pädagogisches Zentrum
Uhlandstr. 97
D 1000 Berlin 31
FRG

Margellen Harmon
Boston College
CSTEEP
Chestnut Hill
MA 02167
USA

Dr. Maher Hashweh
Dept. of Education
Birzeit University
P.O. Box 14
Birzeit, West Bank
via Israel

Dr. Peter Haupt
Schlieffenstr. 74
D 2900 Oldenburg
FRG

B. Hayes-Roth
The Rand Corporation
1700 Main Street
Santa Monica
California 90406
USA

Dr. J. Head
King's College of London
(KQC)
University of London
Chelsea Campus
552 King's Road
London SW 10 0UA, UK

Prof. Dr. R. Hedewig
Gesamthochschule Kassel
FB 19
Postfach 101380
D-3500 Kassel
FRG

Dr. H. Heim
Department of Physics
and Electronics
Rhodes University
Grahamstown 6140
SOUTH AFRICA

Dr. P. u. M. Hewson
Dept. of Curriculum
and Instruction
225 North Mills Street
Madison WI 53706
USA

Dr. Higginson
Mathematics Education
McArthur Hall
Queen's University
Kingston
CANADA K7L 3N6

Dr. H. Hilscher
Universität Regensburg
NWF II - Physik
Universitätsstr. 31
D 8400 Regensburg
FRG

Susan Hojnacki
827 LRDC Bldg.
University of Pittsburgh
Pittsburgh, PA 15260
USA

Brian Honding
Clis Project, CSSME
Physics/Admin Building
(Levello)
University of Leeds LS2 9TT
UNITED KINGDOM

Dr. K. Jaeckel
Universität Oldenburg
FB 8 - Physik
Ammerländer Heerstr. 10
D 2900 Oldenburg
FRG

H. de Jager
Project NME-VO
Physics Education Dept.
State University of Utrecht
Postbus 80.008
NL-3508 TA Utrecht
The Netherlands

O.E. Johansen
Telemark College of
Education
Science Department
N-3670 Notodden
NORWAY

Dr. S. Johsua
Université d'Aix-Marseille
II
Department de Physique
70, route Leon-Lachamp
F-13288 MARSEILLE CEDEX 9
FRANCE

Dr. Brian Jones
University of Tasmania
Australia

Prof. W. Jung
Universität Frankfurt
Institut für Didaktik der
Physik
Gräfstr. 39
D 6000 Frankfurt a.M.
FRG

Prof. Dr. E. Jungwirth
The Hebrew University
of Jerusalem
P.O.B. Rehovot
ISRAEL

Dr. Chr. Kärrqvist
Department of Educ.
Research
University of Gothenburg
P.O. Box 1010
431 26 Mölndal
Schweden

Joachim Kahlke
Up den Wiemen 46
D-2100 Hamburg 90
FRG

Lutz Kaldorf
Odiliengarten 15
D-4050 Mönchengladbach
FRG

Dr. H. Kass
Department of Secondary
Education
University of Alberta
Edmonton
Alberta
CANADA T6G 2G5

Claus Kempe
Kirchstr. 2a
D-2395 Husby
FRG

Dr. J. Kinnear
School of Biological Sc.
Lincoln Institute of Health Sciences
625 Swanston Street, Carlton
Victoria 3053 Australia

Dr. E. Kircher
Steinburgstr. 96
D 8700 Würzburg
FRG

Ms. Valda Kirkwood
Science Education Research Unit
University of Waikato
Private Bag
Hamilton
New Zealand

Prof. E. Kiewitz
FU Berlin, ZI 7, WE 6
Habelschwerdter Allee 45
D-1000 Berlin 33
FRG

Prof. Dr. L. Klopfer
LRDC
University of Pittsburgh
3939 O'Hara Street
Pittsburgh, PA 15260
USA

M. Knoche
Neuenhausstr. 76
D-4006 Erkrath
FRG

C. Konold
Department of Psychology
University of Amherst
Amherst, MA 01003
USA

Dr. Armin Kremer
Simmestr. 36
D 3550 Marburg 7
FRG

Prof. Dr. Lenelis Kruse
Fernuniversität
FB Erziehungs- u. Sozialwissenschaften
Postfach 940
D-5800 Hagen 1
FRG

Dr. sc. nat. P. Kubli
Bäulistraße 25
CH 8049 Zürich
Schweiz

Roger Landbeck
Griffith University
Nathan
Brisbane
Queeensland 4111
Australia.

Andreas Lange
Schillerstr. 1
D-7775 Bermatingen
FRG

Dr. P. Licht
Vakgroep Didaktiek Natuurkunde
Boelelaan 1081
NL-1081 MV Amsterdam
THE NETHERLANDS

Dr. P.L. Lijnse
Physics Department
Educational Research Group
Princetonplein 1
NL-3584 CC Utrecht
THE NETHERLANDS

Dr. H. Lin
108 Brook Drive
Ithaca
NY 14850
USA

Dr. M. Linn
University of California
- Berkeley -
California 94720
USA

Prof. J. Lochhead
Department of Physics and Astronomy
University of Massachusetts
Amherst, MA 01003
USA

Prof. Dr. G. Löffler
Universität Bielefeld
Fakultät f. Physik
Universitätsstr. 25
D 4800 Bielefeld 1
FRG

Hubertus Lohmann
Institut f. Heilpädagogik
der PH Kiel
Olshausenstr. 75
D-2300 Kiel
FRG

Christoph Lorenz
Adam-Riese-Str. 30
D-5205 Sankt Augustin 3
FRG

Prof. Arturo Loria
Istituto di Fisica
dell'Universita
Via Campi. 213/A
I-41100 Modena
Italy

Pierre Lucie
MEC/CAPES -4'o andar
C.P. 3540
70 000 Brasilia
BRASIL

StR. J. Lühl
Badensche Str. 54
D 1000 Berlin 62
FRG

Dr. Bernd Lutz
Institut für anorg. Chemie
der Universität Würzburg
Didaktik der Chemie
Am Hubland
D-8700 Würzburg
FRG

Dr. L. Lybeck
University of Goteborg
Department of Education
Box 1010
S-431 26 Mölndal
SWEDEN

Prof. Machold
PH Weingarten
Kirchplatz 2
D-7987 Weingarten
FRG

Dr. U. Maichle
Institut für Test- und
Begabungsforschung
Koblenzer Str.77
D-5300 Bonn 2
FRG

Dr. D.P. Maloney
Creighton University
California at 24th Street
Omaha. Nebrasca 68178
USA

Prof. Dr. H. Mandel
DIFF Hauptbereich Forschung
Bei der Fruchtschranne 6
D 7400 Tübingen
FRG

Dr. M. Martin
Victoria College
Toorak Campus
PO Box 224
Malvern, Victoria
AUSTRALIA

Isabel Pinheiro Martins
Universidade de Aveiro
Centro Integrado de
Formacao de Professores
Departamento de Didactica
e Tecnologia Educativa
3800 Aveiro, Portugal

Mrs. A.T. Filipecki Martins
c/o Prof. E.C. Barbosa
CAPES
Ministereo da Ed. e cultura
Anexo 1-4 andar
BR Brasilia D.F.
Brazil

Prof. F. Marton
Department of Educational
Research
University of Gothenburg
Mölndal
SWEDEN

Prof. G. Marx
Dept. Atomic Phys.
Eotvos University
Puskin u. 5
Budapest 1088
HUNGARY

Dr. R. Maskill
School of Chemical Science
University of East Anglia
University Plain
Norwich
NR4 7TH
ENGLAND

Dr. M.R. Matthews
School of Education
University of New South
Wales
N.S.W. 2033
Australia

Dr. R.E. Mayer
University of California
Santa Barbara, CA 93106
USA

Conxita Mayos
Centre Didactic de Ciencies
Experimentals
Rambla de Catalunya
6. Pral
ES-08007 Barcelona
SPAIN

Dr. McClelland
Division of Education
University of Sheffield
Sheffield S10 2TN
ENGLAND

Prof. Dr. L.C. McDermott
Department of Physics
FM - 15
University of Washington
Seattle, WA 98195
USA

Prof. M. McDermott
Department of Physics FM-15
University of Washington
Seattle
Washington 98195
USA

C. McNaught
University of Natal
P.O. Box 375
Pietermaritzburg
3200 RSA

Dr. C.J. McRobbie
Brisbane CAE
130 Victoria Park Road
Kelvin Grove
Queensland 4059
Australia

Prof. Dr. G. Merzyn
Georg-August-Universität
Erziehungswiss. FB
Waldweg 26
D 3400 Göttingen
FRG

Dr. J. Meyer
P.O. Box 3088
IL 14136 Tiberias
Israel

Str. Kurt Albrecht Meyer
Ahrenshooper Zeile 73
D-1000 Berlin 38
FRG

Joel J. Mintzes
Dept. Biological Sciences
UNC Wilmington
Wilmington, NC 28403-3297
USA

Dr. J.A. Minstrell
Department of Sc. and Math.
4160 86th Avenue S.E.
Mercer Islands
Washington 98040
USA

Carlo Moeller
Sindal Skole
Thorsvej 27
DK-9870 Sindal

Dr. W. Montague
Training Laboratory
Navy Personnel Research and
Developement Center
San Diego, Ca 92152
USA

Prof. E. Fleury Mortimer
Faculdade de Educacao da
UFMG
Av. Antonio Carlos 6627 -
Pampulha
31270 - Belo Horizonte - MG
Brazil

Miss Debbie Mottram
Wesley College
620 High Street Road
Glenwaverly VIC 3150
Australia

H. Muckenfuß
- Dipl.-Päd. -
Allgäustr. 15
D 7980 Ravensburg
FRG

Prof. Dr. H. Niedderer
Universität Bremen
FB 1, WE Didaktik d. Physik
Postfach 33 04 40
D 2800 Bremen 33
FRG

Dr. Henry Nielsen
Institute of Physics
University of Aarhus
DK-8000 Aarhus C
DENMARK

Dr. J. Northfield
Faculty of Education
Monash University
Clayton
Victoria 3168
AUSTRALIA

Prof. Dr. J. Novak
Department of Education
Stone Hall, Cornell
University
Ithaca, N.Y. 148530
USA

Nsumbu-A-Niambu D.M.
Cite Universitaire
46 Av. De Miremont
CH 1206 Geneve
SWISS

Dr. J. Nussbaum
Israel Science Teaching
Centre
The Hebrew University
of Jerusalem
Jerusalem
ISRAEL

Prof. J.M. Ogborn
Department of Sc. Education
University of London
20 Bedford Way
London WC1H OAL
ENGLAND

Dr. Stellan Ohlson
University of Pittsburgh
Learning Research and
Development Center
3939 o'Hara Street
Pittsburgh PA 15620
USA

Dr. J. Olson
Queens University
Kingston
Ontario
CANADA

Ana Onorbe
c/Duque de Medinaceli 12
ES-28014 Madrid
SPAIN

Prof. Gunter Otto
Universität Hamburg
FB Erziehungswissenschaft
Sedanstr. 19
D 2000 Hamburg 13
FRG

Dr. Arnold Paeske
Gartenstr. 60
D-5024 Pulheim 3
FRG

Dr. R. Pastille
Sven-Hedin-Platz 2
D-1000 Berlin 37
FRG

Dr. A.C. Paulsen
Roskilde University Center
Hvedevaenget 16
Stenloese DK-3660
DENMARK

J. Ponte
Departamento de Educacao
Faculdade de Ciencias
AV 24 de Julmo
Lisboa
PORTUGAL

Dr. M.L. Pope
Department of Educational
Studies
Surrey University
Guildford GU2 5XH
SURREY
ENGLAND

Dr. G.J. Posner
Department of Education
Cornell University
Ithaca
N.Y. 14850
USA

Dr. P.F.W. Preece
School of Education
University of Exeter
EXETER EX1 2LU
U.K.

Ruth Prüm
Universität Bremen
Fachbereich 1
Kufsteiner Straße
D 2800 Bremen 33
FRG

Dr. D. Psillos
2nd Laboratory of Physics
School of Physics and
Mathematics
Aristotle University of
Thessaloniki
GREECE

Prof. Sung-Jae Pak
Physics Education
Department
College of Education
Seoul National University
Seoul 151
Korea

Dr. D. Raufuß
TU Hannover
Seminar für Pädagogik
Wunstorfer Str. 14
D 3000 Hannover-L. 1
FRG

Dr. Bruno Redeker
Amtshausenstr. 11
D 4980 Bünde
FRG

Dr. F. Reif
Physics Department of
Science and Math. Education
University of California
Berkeley
CA 94720
USA

Dr. Lauren Resnick
LRDC
University of Pittsburgh
Pittsburgh
Pennsylvania 15260
USA

Prof. Ch. v. Rhöneck
PH Ludwigsburg
Postfach 220
D 7140 Ludwigsburg
FRG

Dr. P. Rieß
Universität Oldenburg
FB 8 - Physik
Ammerländer Heerstr. 67-99
D 2900 Oldenburg
FRG

Dr. M.S. Riley
Program in Cognitive
Science
University of California
San Diego
La Jolla, CA 92093
USA

Dr. J.T. Robinson
Center for Ed. Research
and Evaluation
PO Box 930
Boulder
CO 80306
USA

John W. Rogan
Western Montana College
Montana University
Dillon Montana 59725
USA

Ralf Rössmaier
Halsmühlener Str. 21
D-2800 Bremen
FRG

Ezio Roletto
Universita di Torino
Dipartimento di Chimica
Analitica
Via Pietro Giuria, 5
I 10125 Torino
Italia

Wolfgang Rothen
Simon Fraser University
Faculty of Education
Burnaby, British Columbia
Canada V5A 1S6

T. Russell
APU
King's College
552 King's Road
LONDON SW10 0UA
ENGLAND

Dr. Charles Ryan
King Alfred's College
Winchester SO 22 4NR
UK

Prof. Dr. Roger SÄLJÖ
Dept. of Communication
Studies
University of Linköping
S 581 83 Linköping

Dr. Anselm Salinger
Fleningweg 33b
D-1000 Berlin 42
FRG

Prof. Dr. G. Schaefer
Universität Hamburg
FB Erziehungswissenschaften
Von-Melle-Park 8
D 2000 Hamburg
FRG

H. Schätze
Hundekehlestr. 10
D-1000 Berlin 33
FRG

Jürgen Schaies
Saarlandstr. 6
D-3500 Kassel
FRG

Dr. Barbara Schenk
Dodostraße 6A
D 4400 Münster
FRG

Dr. H.J. Schlichting
Universität Osnabrück
Postfach 44 69
D 4500 Osnabrück
FRG

Prof. Dr. K. Schlösser
Universität zu Köln
Haedenkampstr. 3
D 5000 Köln 41
FRG

Hans Schmidt
Waldstr. 6
D 6106 Erzhausen
FRG

Prof. Dr. W. Schneider
Universität Erlangen-Nürnberg
Glückstraße 6
D 8520 Erlangen
FRG

Dr. Ernst Schneyer
Kaiserstr. 83
D-4330 Mülheim a.d. Ruhr
FRG

Dr. Lutz Schön
Gesamthochschule Kassel
FB 18 - Physik
Heinrich-Plett-Str. 40
D 3500 Kassel
FRG

Akad.Dir. Dipl.Ing.
Ferdinand A. Scholz
Universität Kaiserslautern
FB Erziehungswissenschaft
Postfach 3049
D-6750 Kaiserslautern
FRG

Prof. Klaus Schultz
University of Massachusetts
at Amherst
Furcolo Hall
Amherst, MA 01003
USA

Dr. D.G. Schuster
Physics Department
University of Natal
Durban
4001 SOUTH AFRICA

Prof. Dr. H. Schwedes
Universität Bremen
FB 1 - Physik
Kufsteiner Straße
Postfach 33 04 40
D 2800 Bremen 33
FRG

Siegfried Schwehr
Mühlebächle 10
D-7831 Sexau
FRG

P. Searle
Dept. of Physics
Bendigo C.A.E.
P.O.Box 199
Bendigo, Vic., 3550
Australia

Dr. Norbert M. Seel
Universität des Saarlandes
Medizinzentrum
Im Stadtwald, Bau 6
D 6600 Saarbrücken 11
FRG

Dr. I. Sefton
Department of Physics
University of Sidney
N.S.W. 2006
Australia

Prof. Dr. H. Seitz
PH Ludwigsburg
Abt. Chemie
Reuteallee 46
D-7140 Ludwigsburg
FRG

Rüdiger Semmerling
Krumme Str. 30
D-2900 Oldenburg
FRG

Elvira Sengpiel
Dianastr. 58
D-4200 Oberhausen 11
FRG

Dr. Marie-Genevieve Sere
L.I.R.E.S.P.T.
Universite Paris VII
2 Place Jussieu
F 75221 Paris Cedex 05
France

Dr. Bonnie Shapiro
Dept. of Curriculum
and Instruction
Faculty of Education
University of Calgary
Calgary, Alberta
Canada

Dr. R.J. Shavelson
Graduate School of
Education
University of California
- Los Angeles
California 90024
USA

Dr. M. Shayer
Center for Science
Education
Chelsea College
Bridges Place
LONDON SW6 4HR
U.K.

Dr. D.M. Shipstone
School of Education
University of Nottingham
GB Nottingham NG7 2RD
United Kingdom

Dr. T.J. Shuell
Department of Educational
Psychology
State Univesity of New York
at Buffalo
Amherst, N.Y. 14260
USA

Dr. S. Sjoberg
Institute of Physics
Box 1048
The University of Oslo
Blindern
Oslo 3, Norway

Dr. Lucille Slinger
312 B Morris Hall
University of Wisconsin
La Crosse WI 54601
USA

Debbie Smith
112 Willard Hall Bldg.
College of Education
University of Delaware
Newarte, DE. 19716
USA

Dr. E.L. Smith
Science and Math
Teaching Centre
Michigan State University
East Lansing
MI 48824
USA

Tania Solomaniuk
Zelfstudiecentrum-B/QUOP
Vrije Universiteit Brussel
Pleinlaan 2
B 1050 Brussel
Belgium

Dr. J. Solomon
Department of Educational
studies
University of Oxford
15 Norman Gardens
OXFORD OX2 6PY
ENGLAND

Prof. Dr. Karl-Heinz Sommer
Keplerstraße 17, 7. Stock
D-7000 Stuttgart 1
FRG

Lothar Spill
Institut für Didaktik
der Physik
Universität Frankfurt
Gräfstr. 39
D-6000 Frankfurt 1
FRG

Prof. Dr. K. Spreckelsen
Gesamthochschule Kassel
FB 18 - Didaktik d. Physik
Heinrich-Plett-Str. 40
D 3500 Kassel
FRG

Dr. Ruth Stavy
Matal School of Education
Tel-Aviv University
Ramat Aviv
Tel-Aviv 69 978
Israel

Prof. M.S. Steinberg
Department of Physics
Smith College
Northampton,
Massachusetts 01063
USA

Dr. M. Steinfatt
Technische Universität
Institut f. organ. Chemie
Leibnizstr. 6
D-3392 Clausthal-Z.
FRG

Dr. J. Stewart
College of Education
University of Wisconsin
Madison
Wisconsin 53706
USA

Elisabeth Strack
Kornweg 6
D-2000 Hamburg 63
FRG

Dr. S. Strauss
School of Education
University of Tel-Aviv
Tel-Aviv
ISRAEL

Dr. K. Strike
Department of Education
Cornell University
Ithaca, N.Y. 14850
USA

Dr. C.R. Sutton
School of Education
University of Leicester
University Road
Leicester LE1 7RH
U.K.

Piyush Swami
University of Cincinnati
College of Education
606 Teachers College
Building
Cincinnati, Ohio 45221-0002
USA

Dr. Vivian Talisayon
Science Education Center
University of the
Philippines
Pardo de Tavera
Diliman/Quezon City
THE PHILIPPINES

Dr. Pinchas Tamir
Israel Science Teaching
Centre
Hebrew University
Jerusalem
ISRAEL

Dr. Y. Tenney
Bolt Beranek and Newman
Inc.
60 Moulton Street
Cambridge, Mass. 02138
USA

Dr. P. Thorndyke
The Rand Corporation
1700 Main Street
Santa Monica
California 90406
USA

Dr. A. Tiberghien
L.I.R.E.S.P.T.
Université Paris VII
Tour 23 - Couloir 23 - 13
2, place Jussieu
F 75230 PARIS CEDEX 05
FRANCE

Dr. D.F. Treagust
Curtin University
Science and Mathematics
Education Center
Kent Street
Bentley 6102
WESTERN AUSTRALIA

Prof. Hugo E. Tricarico
Ministerio de Educacion y
Justicia
Paseo Colon 533
4 Piso (1063)
Buenos Aires
Argentina

S. Ulerick
Department of Geology
University of Oregon
Eugene, OR 97403
USA

Universität Oldenburg
Bibliothek
Ammerländer Heerstr. 67-99
D-2900 Oldenburg
FRG

Marc Vanderlocht
Tiensestraat 115
B-3000Leuven
Belgie

Dr. M. Vicentini-Missoni
Universita degli studi di
Roma
La Sapienza
Piazzale Aldo Moro 2
I-00185 Roma
ITALY

Dr. L. Viennot
Université Paris VII
G.P.S. Tour 23
2 Place Jussieu
F-75221 Paris Cedex 05
France

Dr. Luisa Viglietta
Via Garessio 3312
I 10126 Torino
ITALY

Bruno Völker
PH Ludwigsburg
Postfach 220
D 7140 Ludwigsburg
FRG

Prof. Dr. G. Vollmer
Buchholzstr. 26
D 5300 Bonn 1
FRG

Hans-Peter Voss
Institut für die Didaktik
der Physik
Universität Frankfurt
Gräfstr. 39
D-6000 Frankfurt 11
FRG

Dr. I. Wachsmuth
FB Mathematik
Universität Osnabrück
Albrechtstr. 28
D 4500 Osnabrück
FRG

Artur Wagner
Obernburger Str. 19
D-8761 Mömlingen
FRG

A. Wals
Agricultural University
Dept. of Education and
Teacher Training
Hollandse Weg 1
NL-6706 Wageningen
THE NETHERLANDS

Prof. A. Walz
PH Weingarten
Kirchplatz 2
D 7987 Weingarten
FRG

Prof. Dr. J.H. Wandersee
Martin Luther College
New Ulm
Minnesota 56073
USA

V.S.Varma
Department of Physics and
Astrophysics
University of Delhi
Delhi 110007
India

Dr. D. M. Watts
101-109 Great Portland
Street
London
W1N 4 BA
England

D.A. Well
Department of Psychology
University of Massachusetts
Amherst, Mass. 01003
USA

Prof. Dr. K. Weltner
Universität Frankfurt
FB 13 - Didaktik d. Physik
Gräfstraße 39
D 6000 Frankfurt/M. 90
FRG

Dr. L.H. West
Monash University
Clayton
Victoria
Australia

Mrs Maria Ester Weyne Jure
Av. Presidente Kennedy 1800
Apto 1302
60 000 Fortaleza - Ceara
Brasilien

Dr. A.E. Wheeler
College of Education
Brock University
St Catherines
Ontario
CANADA L2S 3A1

Dr. B.Y. White
BBN Laboratories
10 Moulton St.
Cambridge. Mass. 02238
USA

Prof. R.T. White
Faculty of Education
Monash University
Clayton 3168
Australia

Denise Whitelock
University of London
Institute of Education
20 Bedford Way
London WC 1H 0AL
UK

Prof. Dr. Karl-A.
Wiederhold
Universität Dortmund
Fachbereich 12
Postfach 500500
D-4600 Dortmund 50
FRG

Dr. H. Wiesner
Institut für Didaktik
d. Physik
Universität Frankfurt
Gräfstr. 39
D 6000 Frankfurt a. M.
FRG

Dr. M. Wiser
Department of Psychology
Clark University
Worcester
MA 01610
USA

Prof. D. Woods
Department of Chemical
Engineering
McMaster University
Hamilton
Ontario
CANADA L8S 4L7

Dr. B.E. Woolnough
Oxford University
15 Norham Gardens
Oxford OX2 6PY
ENGLAND

Ewald Woppowa
Beethovenstr. 20
D-3502 Vellmar
FRG

Dr. Arden Zylbersztajn
Depto. de Educacao - CCSA
Caixa Postal 1616 (Ag.
Campus)
UFRN
59000 Natal RN
Brasilien

Liste aller Schlagwörter I / List of keywords I

	Schlagwörter für die Einteilung in Gruppen	Keywords for assigning to groups
g1	Zum Umfeld des Problems Vorstellungen der Schüler	General considerations concerning research in this area
g2	Alltagsvorstellungen und wissenschaftliche Vorstellungen	Everyday notions and scientific notions
g3	Geschichtliche und individuelle Entwicklung von Vorstellungen	Development of notions in the history of science as compared to development of notions in individuals
g4	Sprache und Vorstellungen	Language and notions
g5	Methoden zur Erfassung von Vorstellungen	Methods to investigate notions
g6	Untersuchungen zu Vorstellungen (von Schülern)	Investigations of (students') notions
g7	Unterricht unter Berücksichtigung von Vorstellungen	Instruction taking students' notions into account
g8	Untersuchungen zu Vorstellungen von Lehrern	Investigations of teachers' notions
g9	Vorstellungen und Lehrerbildung	Notions and teacher training

Liste aller Schlagwörter II / List of keywords II

	Weitere Schlagwörter für die Gruppen g6, g7 und g8	Further keywords for groups g6, g7 and g8
B	Biologie	biology
C	Chemie	chemistry
P	Physik	physics
AT	- Atome und Teilchen	- atoms and particles
AS	- Astronomie	- astronomy
E	- Elektrizität	- electricity
EN	- Energie	- energy
ENT	- Entropie	- entropy
FLD	- Feld	- field
INF	- Information	- information
IRR	- Irreversibilität	- irreversibility
MAG	- Magnetismus	- magnetism
M	- Mechanik	- mechanics
O	- Optik	- optics
Q	- Quantenphysik	- quantum physics
R	- Relativistische Physik	- relativistic physics
S	- Schall	- sound
STAT	- Statistische Physik	- statistical physics
T	- Wärme (Therm. Physik)	- heat (thermal physics)
CTL	- Vorstellungen des Lehr-, Lernprozesses	- conceptions of teaching/learning
CSC	- Vorstellungen zur "Natur" der Wissenschaften	- conceptions of science
STS	- Vorstellungen zum Nutzen naturwissenschaftlicher Kenntnisse in Technik und Gesellschaft	- conceptions of the use of science for technology and society
GEN	- geschlechtsspezifische Unterschiede werden untersucht	- gender differences are investigated